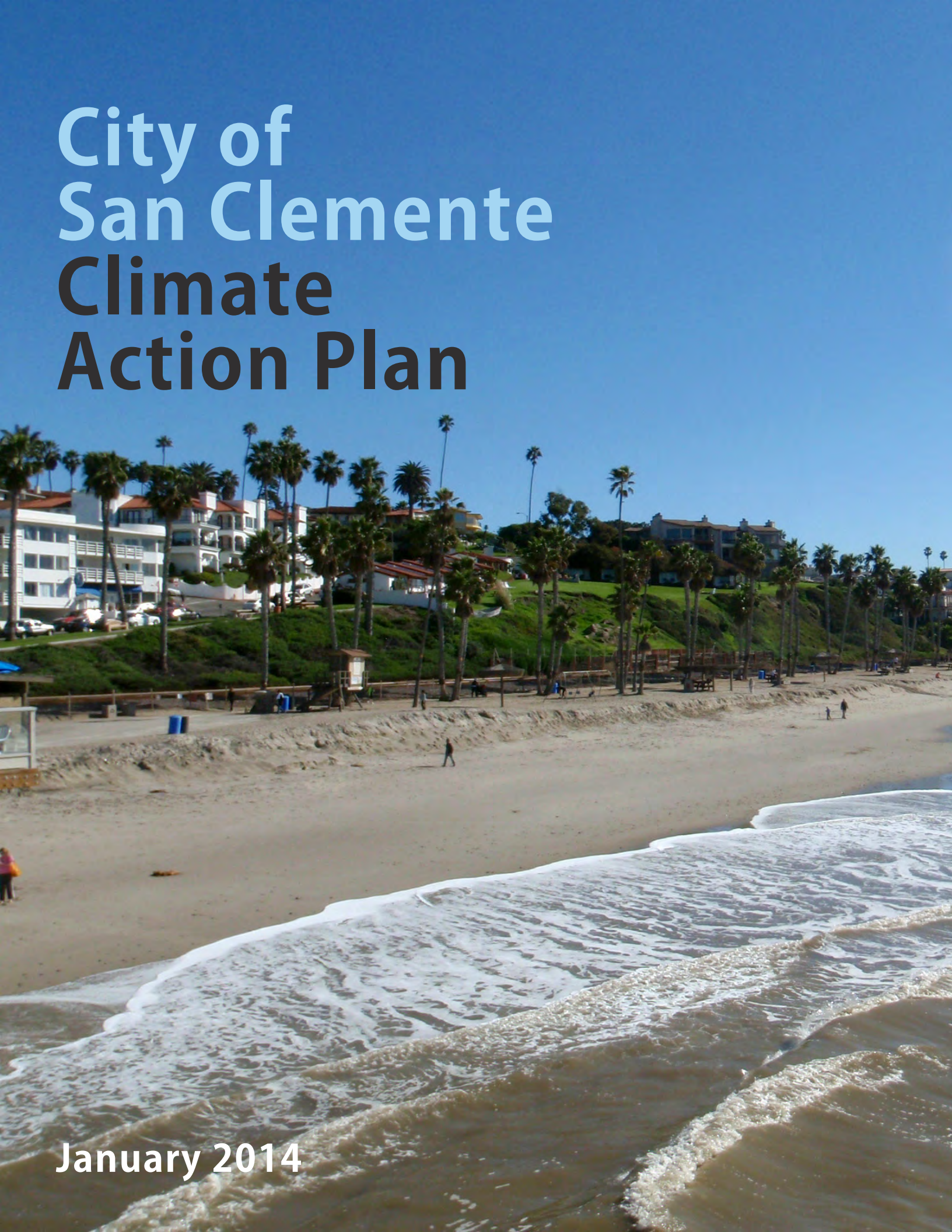
City of San Clemente Climate Action Plan



January 2014

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This Climate Action Plan was prepared for the City of San Clemente under the direction of project manager Tom Bonigut, Assistant City Engineer.

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Introduction

California has taken several progressive policy steps to address climate change. State actions alone cannot solve climate change, however the adoption and implementation of this legislation demonstrates California's leadership in addressing the challenge. California's climate action goals are rooted in the California Global Warming Solutions Act, or AB32, which seeks to reduce state greenhouse gas emissions to 1990 levels by 2020, and the California Environmental Quality Act (CEQA), which requires that local governments consider the impact of greenhouse gases in proposed development projects and General Plan updates.

AB 32 does not require cities in California to complete Climate Action Plans. However, the Attorney General's Office has confirmed that Climate Action Plans are acceptable mitigation strategies for cities conducting General Plan Updates. Specifically, the Attorney General recommends that CAPs are prepared at the same time as a General Plan Update and EIR to expedite CEQA clearance for the GP. Further, the Attorney General urges cities to incorporate any Climate Action Plans into their general plan to ensure that provisions are applied to all relevant projects.

In California, there are over 50 municipalities that are pursuing a similar climate response measure, by creating and adopting a Climate Action Plan (Office of Planning and Research, 2012). Similarly, major cities around the United States have implemented Climate Action Plans include Portland, Seattle, Chicago, New York, Miami, Denver, Pittsburgh, and Albuquerque.

The City of San Clemente's Climate Action Plan (CAP) is the first step in the development of a long range, comprehensive plan to move from business-as-usual growth practices to an environmentally and economically sustainable growth model. With that objective, the CAP provides a roadmap to reduce emissions that will complement California's climate change objectives.

The impacts of global climate change will include impacted air quality, diminished water supplies, higher seasonal temperatures, sea level increases, coastal erosion and potential loss of protected species and habitats. In response, the City has assessed community and municipal emissions, and has created a plan to decrease these emissions utilizing the best technology and strategies available today. The CAP includes a 2009 baseline greenhouse gas inventory and establishes citywide emission greenhouse gas reduction goals for 2020 and 2030. To implement these goals, the CAP includes a series of strategies designed to reduce local emissions.

Relationship to the City's Centennial General Plan and the 2010 Sustainability Action Plan

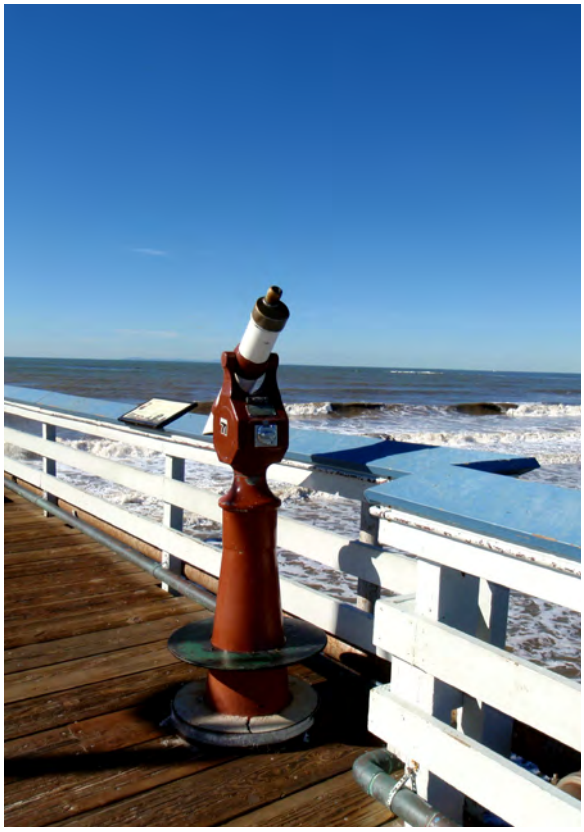
The CAP is linked to the City's Centennial General Plan (GP) and 2010 Sustainability Action Plan (SAP). The GP remarks on the critical role the natural environment plays in sustaining community lifestyle and the local economy. As such, the 2013 CAP builds upon the environmental values set forth in the GP. In addition to the GP, the SAP serves as an overall roadmap for San Clemente to increase sustainability of its operational practices. Both the CAP and the SAP focus on water, energy, and waste consumption as areas targeted for action. Moreover, both the SAP and the CAP will benefit public and environmental health. All plans identify community engagement and ownership of San Clemente's environment as a key to success.

Relationship to the California Environmental Quality Act (CEQA)

In 2010, CEQA published updated amendments that added greenhouse gas emissions to the list of environmental impacts that jurisdictions are required to examine. The CEQA amendments require that GHG significance be assessed at both a project and a cumulative level. According to CEQA, one option for evaluating GHG significance is by testing for compliance and consistency with a Climate Action Plan.

If a lead agency wants to rely on its CAP as a threshold, it is important that CAP emission reduction targets are consistent with AB 32 and that mechanisms for oversight and monitoring of each reduction measure are included to evaluate GHG emissions reduction progress. San Clemente's approach to emission reduction is consistent with the climate change planning process. This process is:

1. Complete a baseline GHG inventory and forecasting future emissions;
2. Establish a citywide GHG reduction target;
3. Develop a CAP that creates strategies to meet the reduction target;
4. Evaluate the CAP's environmental impact; and
5. Include monitoring and enforcement measures in the Climate Action Plan.



Primer on California Climate Legislation

Executive Order S-3-05 states that California is vulnerable to the effects of climate change, including reduced snowpack in the Sierra Nevada Mountains, exacerbation of California's existing air quality problems, and sea level rise. To address these concerns, the executive order established statewide targets to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

Assembly Bill 32 requires California to reduce statewide GHG emissions to 1990 levels by 2020, and directs the Air Resources Board (ARB) to develop and implement regulations to reduce statewide GHG emissions. ARB's Scoping Plan identifies California's cities and counties as "essential partners" within the overall statewide effort and recommends that local governments set a GHG reduction target of 15 percent below 2005-2008 levels by the year 2020.

Senate Bill 375 established a process to establish regional targets for reduced passenger vehicle and light duty truck GHG emissions for each Metropolitan Planning Organization in the state, including the Southern California Association of Governments (SCAG). The Air Resources Board targets for the SCAG region include an eight percent per capita reduction by 2020 and a 13 percent per capita reduction by 2035.

Senate Bill 97 acknowledges that climate change is a prominent environmental issue that requires analysis under the California Environmental Quality Act (CEQA). CEQA Guidelines were updated in 2010 to include provisions for mitigating GHG emissions and/or the effects of GHG emissions.

Background on Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are both naturally occurring and anthropogenic greenhouse gas emissions. Such things as decomposition of organic material and volcanic eruptions contribute to GHG in the atmosphere. Over the eons, the natural world had developed a balance between natural GHGs released and the mechanisms that absorbed it. The anthropogenic GHG emissions are primarily from our use of fossil fuels, deforestation, and farming and ranching practices. The "greenhouse effect" is the result of a tight blanket of gasses in the atmosphere that trap incoming solar radiation (heat). The human contribution of GHG has amplified this effect and the increased heat it is causing has already been observed and measured. Absent action, it will continue to increase. This trapped heat impacts the climate in a number of ways, including changing the patterns of airflow and ocean currents. Emissions remain in the atmosphere for about 100 years, and so the impacts we are experiencing today are from the activities of previous generations.

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2

Reducing Emissions

2009 Baseline Inventory

To measure greenhouse gases in San Clemente, the city commissioned a baseline greenhouse gas inventory to quantify emissions from all municipal and community sources. The purpose of an inventory is to identify source types, distribution, and overall magnitude of GHG emissions to enable policy makers to implement cost-effective GHG-reduction strategies in policy areas over which they have operational or discretionary control.

The City's community and municipal inventories were prepared for the year 2009, as this was the most recent year that complete utility records were available. Selecting 2009 as the baseline year allowed the inventory to capture the impact of the economic recession on GHG emissions. The inventory was prepared using the Local Government Operations Protocol (LGOP), which was designed to assist local governments in quantifying and reporting GHG emissions. The GHG inventory used emissions factors recommended by the US Environmental Protection Agency (EPA) and the Intergovernmental Panel on Climate Change (IPCC), among others, to estimate CO_2e emissions for municipal operations and community activities.

The results of the inventory were broken down into emissions sectors under the City's jurisdiction that the CAP will target for reduction. City staff and the consultant team collected data from various sources, including City departments, public utilities, and private entities that provide services to and within the community. Data collection included activities specific to municipal operations (e.g. local government energy use, vehicle fuel use/mileage, water use, and solid waste disposal) and communitywide activities (e.g., total citywide energy use, vehicle miles traveled (VMT), solid waste disposal, water use, and wastewater generation) that occurred in 2009.

The breakdown of GHG emissions in the community is very similar to that of other Southern California cities. Due to the very high frequency of single-occupancy vehicles on the road, the transportation sector results in the largest output of GHG emissions, followed by the energy sector (electricity and natural gas).

San Clemente's baseline greenhouse gas emissions for 2009, expressed in terms of metric tons of carbon dioxide equivalent (MT CO_2e) totaled 620,024.

Per-capita emissions for the City were 10 MT CO_2e/person in 2009. Municipal operation contributed **5,995** MT CO_2e, which less than 1 percent of the total communitywide GHG emissions. The primary source of municipal GHG emissions is energy consumption.

Figure 2.1: 2009 Community-wide Emissions Inventory

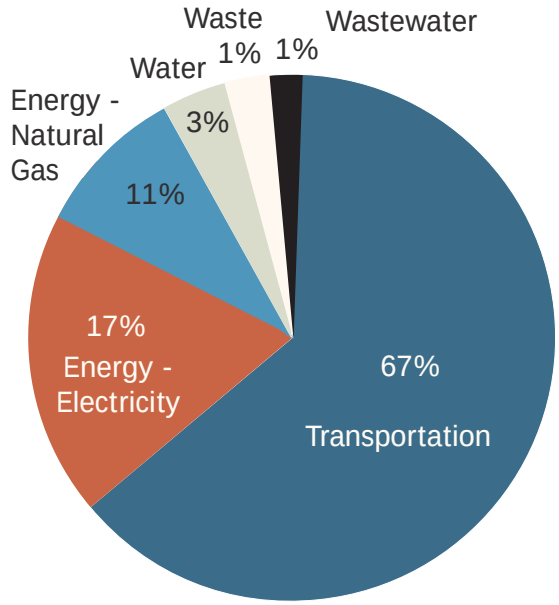
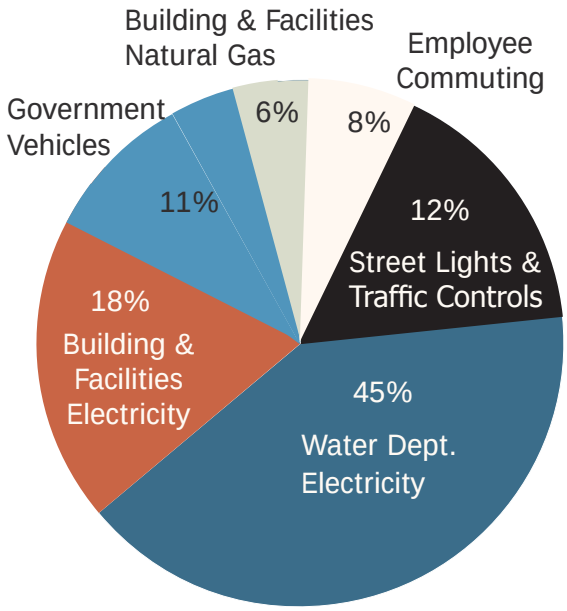


Figure 2.2: 2009 Municipal Emissions Inventory



2020 and 2030 Forecasts

San Clemente conducted a forecast emissions scenario under business-as usual (BAU) conditions. The City then determined growth conditions derived from historical trends in population, employees, energy consumption, and land use. The CAP outlines forecasts for 2020 and 2030 (build out of the Centennial General Plan) to comply with federal, state, and local regulations (i.e., AB 32 and SB 375).

The City anticipates an increase in emissions by approximately 0.3 percent for 2020 and 0.8 percent for 2030. Forecast emissions do not show a significant increase, because the population is expected to remain relatively stable.

2020 and 2030 Reduction Targets

The City of San Clemente utilized California emissions reduction targets to guide the development of the City's CAP. Because 2009 serves as the year of the baseline inventory, the reduction targets are expressed as percent reductions below 2009 levels.

2020 Target: 15 percent below 2009 Levels

Selecting a reduction target that calls for GHG emissions to be 15 percent below 2009 levels by 2020 offers the following benefits:

- Consistent with current guidance offered by ARB and the California Attorney General's Office.
- Demonstrates contribution to State AB 32 GHG emissions reduction goals for 2020.

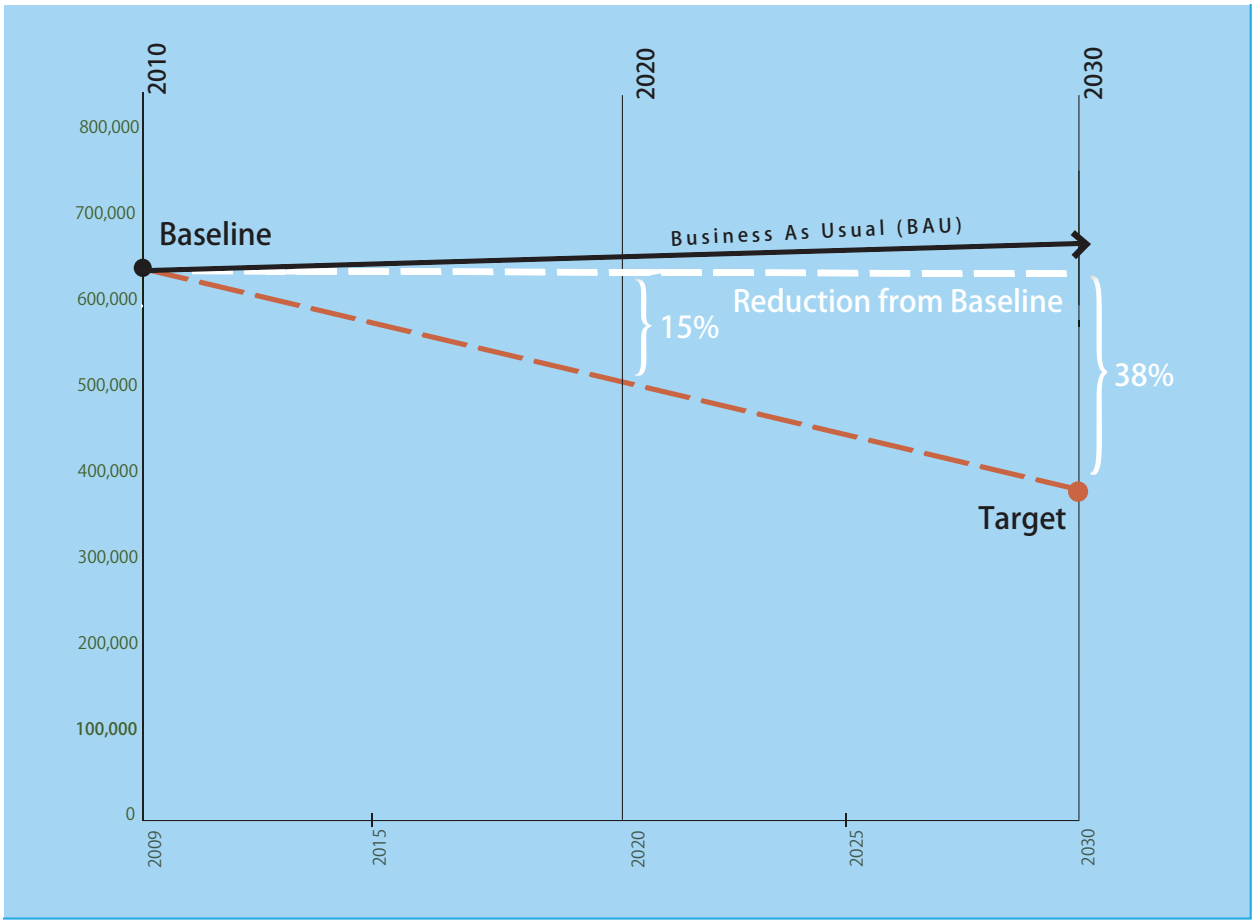


Figure 2.3: Projected Targets and GHG Emissions Reduction

Achieving a 15 percent reduction below 2009 levels would require emissions to be reduced by approximately 93,004 MT CO_2e/year from existing levels by 2020.

2030 Target: 38 percent below 2009 Levels

A target that strives to reduce GHG emissions to 38 percent below 2009 levels by 2030 provides the following benefits:

- Demonstrates a trajectory toward the State's long-term (EO-S-3-05) emissions reduction goals.
- Consistent with the guidance offered by the California Attorney General's Office
- Aligns with the City of San Clemente Centennial General Plan planning horizon.

These forecast years for 2020 and 2030 reflect federal, state, and local regulations (i.e., AB 32 and EO S-3-05) and coincide with the build out of the Centennial General Plan. Combined Citywide and Statewide reduction measures are expected to decrease emission by 17 percent in 2020 and 43 percent for 2030. Reduction measures for 2020 are included in the values for 2030.

Achieving the 38 percent reduction below 2009 levels would require emissions to be reduced by approximately 235,609 MT CO_2e/year from existing levels by 2030.

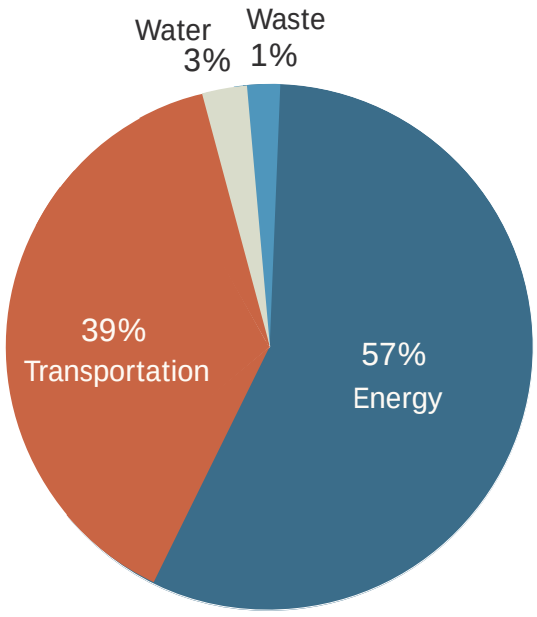
Table 2.1: GHG Emissions Breakdown

	2020	2030
	MT CO_2e	MT CO_2e
2009 Baseline Inventory	620,024	620,024
Reduction Targets (15% / 38%)	-93,004	-235,609
Reduction Targets from 2009 Baseline	527,020	384,415
2009 Baseline Inventory	620,024	620,024
Forecasted Growth from 2009 Baseline	+7,934	+12,760
Business-as-Usual Forecasted Emissions	627,958	632,784
Total Emissions Reductions (Refer to Table 2.2)	-109,999	-267,490
Total Emissions AFTER Reduction Measures	517,959	365,294
Reduction Targets from 2009 Baseline	527,020	384,415
Total Emissions AFTER Reduction Measures	517,959	365,294
Exceedance Beyond 2020/2030 Targets	9,061	19,121

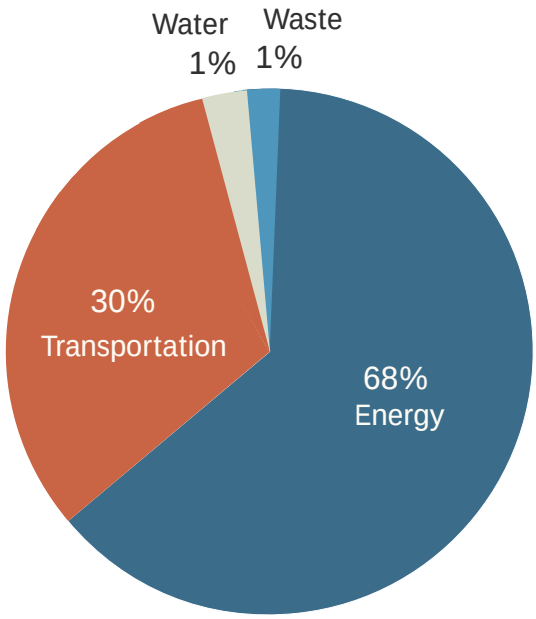
Table 2.2: Total GHG Emissions Reductions

	2020		2030	
	MT CO_2e Reduction	% of total Reduction	MT CO_2e Reduction	% of total Reduction
Measure 1: Alternative Transportation				
1.1 Combined Transportation Measures	4,200	5%	4,223	2%
Measure 2: Energy Efficiency				
2.1 Residential Efficiency Retrofits	3,487	3%	8,746	3%
2.2 Commercial Efficiency Retrofits	1,796	2%	4,549	2%
2.3 Residential New Construction Efficiency	2,044	2%	6,216	2%
2.4 Commercial New Construction Efficiency	1,611	1%	4,900	2%
2.5 Residential Solar Water Heaters	5,505	5%	19,342	7%
Measure 3: Waste Reduction				
3.1 Expand Waste Material Diversion	1,538	1%	2,156	1%
Total Local Reduction Strategies	**20,181**	**18%**	**70,313**	**26%**
State Reduction Measures				
CA Renewable Portfolio Standard	40,894	37%	40,894	15%
CA Electricity Energy Efficiency Standards	5,487	5%	16,071	6%
CA Natural Gas Efficiency Standards	1,361	1%	6,064	2%
CAFE (Pavley) & LCFS	37,903	35%	41,758	16%
Water Conservation Program	3,372	3%	3,372	1%
Total State Reduction Measures	**89,018**	**82%**	**197,177**	**74%**
Total GHG Emission Reductions	**109,199**	**100%**	**267,490**	**100%**

Figures 2.4 and 2.5 breaks down the various GHG emission reductions by sector for both 2020 and 2030.



2020



2030

Reduction Measures

The majority of emissions reductions in San Clemente will be achieved through state measures. California has implemented the following measures targeted at statewide GHG reduction:

Federal Corporate Average Fuel Economy

The US EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) joint rule established a national program consisting of new standards for model year 2012 through 2016 light-duty vehicles that has already reduced GHG emissions and improved fuel economy.

Federal Alternative Fuels Strategies

Based on current GHG emission reporting guidelines, the transportation sector directly accounted for about 28 percent of total U.S. GHG emissions in 2006, making it the second-largest source of GHG emissions, behind only electricity generation (34 percent). An alternative fuel, as most generally defined, is any fuel other than the traditional selections, gasoline and diesel, used to produce energy or power. The federal government via the EPA has a renewable fuel standard program (RFS2) from 2010 adopted under the EP Act of 2005 requiring a certain volume of renewable fuel especially bioethanol to be blended into gasoline by 2012 and 36 billion gallons by 2022. However, in November 2013 these requirements were reduced due to increases in feedstock prices.

California Renewables Portfolio Standard

Established in 2002 under SB 1078, accelerated in 2006 under SB 107 and expanded in 2011 under SB 2, California's Renewables Portfolio Standard (RPS) requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020.

California Low Carbon Fuel Standards

Executive Order S-1-07, the LCFS calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.

California Energy Commission and California Air Resources Board Vehicle Maintenance Recommendations

The California Legislature required a California measure to reduce petroleum dependence, including increasing transportation energy efficiency by adhering to specific vehicle use and maintenance recommendations.

California Air Resources Board Heavy Duty Vehicle Regulations

Adopted in December 2008, this regulation requires improvements in heavy-duty vehicles. The regulation is expected to reduce greenhouse gas emissions by approximately 1 million metric tons of CO_2e by 2020, statewide. Between now and the end of 2020, after the rule has been in effect, it is estimated that truckers and trucking companies will save about $8.6 billion because diesel fuel consumption will be reduced by as much as 750 million gallons in California and 5 billion gallons across the nation.

Local Reduction Measures

San Clemente will reach its emissions targets by implementing CAP reduction measures that address a diversity of issues. As indicated previously, state and federal actions will comprise the bulk of San Clemente's emissions reductions. The reduction measures are based on the analysis of the quantity and sources of greenhouse gas emissions gathered during the inventory, and seek to create emissions reductions that are realistic and achievable for our City. The City has designed these reduction strategies to meet the 2020 and 2030 targets.

Whenever possible, the CAP measures have been designed to be economically advantageous to San Clemente businesses, residents, and government. Many of the CAP measures decrease energy costs for consumers. Investing in energy efficiency and renewable energy can assist individuals, households and businesses by reducing energy demand and by providing long-term savings for operations and maintenance budgets. Similarly, the energy conservation and efficiency activities will increase energy security and independence. Measures that reduce emissions of greenhouse gasses also decrease demand for imported energy from unstable sources, and especially target carbon-intensive fuels like oil. These measures include infill development, alternative transportation, and smarter building design and construction practices. **The following Chapter 3 details the individual local measures.**

The Importance of Individual Actions

For San Clemente to reach its emission reduction goals, residents and businesses must take ownership of the Climate Action Plan and make changes to reduce emissions. While climate change is undoubtedly a global problem, total emissions are a cumulative result of individual actions.

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Implementation

The CAP identifies a comprehensive set of targets and related measures that the City will use to reduce GHG emissions. These actions include a combination of General Plan programs, City Council policies, resolutions, and incentives, as well as outreach and education activities. As implementation occurs, each target and related measure will be continuously assessed and monitored. The City of San Clemente recognizes the need for proper staffing, financing, and resource allocation to ensure the success of each mechanism included in the CAP.

To ensure that San Clemente is on track to reach its reduction targets, the City staff will periodically evaluate the entire plan (with respect to 2020 and 2030 targets) and evaluate the individual strategies. This section establishes a timeline for monitoring, and grants the City the ability to make amendments to the plan as needed. The Plan identifies the time frame for which each measure is to be implemented. Priority has been given to projects based on cost effectiveness, GHG reduction potential, available funding, and the ease and length of time for implementation. However, some implementation mechanisms may not be completed in the time frame indicated.

Staffing

Within the Plan, the City has identified responsible departments for each action. The City will also assign a coordinator to oversee the implementation of all actions outlined in the CAP. To increase efficiency and reduce costs, the City will integrate these actions into the context of existing workloads and programs whenever possible.

Re-Inventory

To check overall CAP progress, the City will re-inventory community-wide GHG emissions every five years for comparison against the baseline 2009 inventory. The same methodology will be used to evaluate GHG emissions in each five-year interval as was used in the baseline year. This will ensure that the future inventories are comparable to the baseline inventory. Each CAP measure prescribes the required amount of participation needed to achieve the estimated GHG reduction for that action. The City will check for rate of participation, implementation costs, and obstacles to implementation.

Alternative Transportation Measures

San Clemente's development history has created transportation infrastructure that relies almost exclusively on passenger vehicles to provide for the mobility needs of the city's residents. In San Clemente, 67 percent of all greenhouse gas emissions from the jurisdiction originate from transportation.

The preponderance of emissions from transportation in San Clemente is not surprising since the dominant mode of development throughout the Southern California region has relied on highways and passenger vehicles for mobility for nearly a century. Though daunting, the challenge of low-carbon mobility has been confronted by other cities in California and around the world and have answered it with strategies including neighborhood electric vehicles, enhanced amenities for pedestrians and cyclists, and regional mass transportation partnerships.

San Clemente citizens can have a big impact on communitywide emissions by reducing their driving. Alongside reducing individual emissions, San Clemente will experience health benefits through walking or biking to their destinations whenever feasible.

Worker trip data, based on the 2009 Census Longitudinal-Employer Household Dynamics Origin Destination Employments Statistic (LODES), was collected and analyzed to quantify and understand the work trips related to San Clemente.

The LODES data showed that there are a total of 16,194 jobs in the City of San Clemente and have the following patterns:

Work Flows:

- 12,761 employees live outside the City, but work in the City
- 3,433 employees live and work in the City
- 15,913 employees live in the City, but work outside the City

Distance to Work:

- 38 percent drive under 10 miles
- 19 percent drive between 10-24 miles
- 27 percent drive between 25 and 50 miles
- 16 percent drive over 50 miles

This data ultimately aids in the development of strategies and associated reductions.

Alternative Transportation Measure 1: Expand Pedestrian Network

Providing a pedestrian access network to access all areas of San Clemente encourages people to walk instead of drive. The mode shift results in people driving less and thus reducing VMT. Some potential strategies included in this category are the widening of any existing sidewalks, the completion of any gaps in the sidewalk network, or the extension of any existing sidewalks to provide access to desired areas of the City. This would also require eliminating physical barriers

such as walls, landscaping, and slopes that impede pedestrian circulation. It is anticipated that much of this pedestrian network expansion would occur in conjunction with development and redevelopment throughout the City.

Predicted Level of Implementation

The implementation mechanism is the San Clemente Bicycle and Pedestrian Master Plan, which serves as a roadmap for developing pedestrian infrastructure and programs in the City. It encourages development of practical, safe, and enjoyable environments all while emphasizing and promoting walking as a viable transportation option.

Potential VMT Reductions

Empirical research indicates that pedestrian network improvements yield a 1-2 percent reduction in VMT, based on the scale of the proposed improvements. As these improvements are potentially limited in scale to various areas of the City, we would recommend applying the more limited VMT reduction at 1 percent.

Alternative Transportation Measure 2: Require Bicycle Parking

One way to facilitate bicycle travel is to require bicycle parking for both public and private uses. This measure identifies additional opportunities to place public use bicycle parking or to modify existing

parking requirements for bicycles with the aim of increasing the supply of parking. This measure is limited in that it applies to selected new developments within the City, which are larger than an identified threshold in terms of building size, number of employees, or other applicable criteria.

Some potential strategies included in this category are:

- **Commercial and Residential Bicycle Parking:** This measure includes requiring non-residential projects to provide permanent bicycle parking facilities to meet peak season maximum demand along with requiring residential multi-family projects to provide long-term parking facilities for all residents.
- **Transit Bicycle Parking:** This measure provides short-term and long-term bicycle parking near rail stations, transit stops, freeway access points, and park-and-ride lots. Bicycle parking provides a "first-mile" solution to commuters who may have limited access to major transportation hubs.

Predicted Level of Implementation

The implementation mechanism is the recently completed San Clemente Bicycle and Pedestrian Master Plan. The City should also work with local transit providers to implement parking at transit facilities.

Potential VMT Reductions

The effects of bicycle parking on worker trips is most applicable to those workers who live and work in the City of San Clemente, which comprises about 21 percent of the total worker trips coming into San Clemente. Additionally, these facilities may also be used by shorter work trips, which make up about 38 percent of all work trips. Empirical studies indicate that the maximum reduction in VMT achieved with this measure is approximately 0.5 percent. We would therefore consider that this reduction would likely be the maximum that the City could achieve, particularly given the limited scale of application that might occur by narrowing the requirements to a subset of new development.

Alternative Transportation Measure 3: Develop Off-Street Bicycle Facilities

Another means to encourage bicycle travel is to develop and implement off-street bicycle trails which can be used for both recreational travel and commuting purposes. One potential measure is requiring buildings of certain size or adjacent to bikeways to include off-street bicycle paths or lanes in their plans and construction as part of their project approval.

Predicted Level of Implementation

Similar to Measures 1 and 2, the implementation mechanism is the San Clemente Bicycle and Pedestrian Master Plan, which serves as a roadmap for developing bicycle infrastructure and programs in the City. It encourages development of practical, safe, and enjoyable environments all while emphasizing and promoting bicycling as a viable transportation option.

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Potential VMT Reductions

Research has shown that adding bicycle facilities can increase the percentage of commuters who travel by bicycle. As such, we would assume that the benefits of this measure would be 1 percent of VMT as this represents the typical experience observed.

Alternative Transportation Measure 4: Incorporate Bike Lane Street Design Through the San Clemente 2013 Bicycle and Pedestrian Master Plan

The City's Bicycle and Pedestrian Master Plan incorporates bicycle lanes, routes, and shared-use paths into street systems, new subdivisions, and large developments. These on-street bike accommodations will be created to provide a continuous network of routes, facilitated with markings and signage. These improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. Improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area" of these transit stop or station and increasing ridership.

Predicted Level of Implementation

The implementation mechanism is the San Clemente Bicycle and Pedestrian Master Plan, which serves as a roadmap for developing bicycle infrastructure and programs in the City. It encourages development of practical, safe, and enjoyable environments all while emphasizing and promoting bicycling as a viable transportation option.

Potential VMT Reductions

The benefits of this measure would be 1 percent of VMT as this represents the typical experience observed.

Alternative Transportation Measure 5: Encourage the Use of Electric Vehicles

San Clemente will help accelerate the transition to plug-in hybrids and electric vehicles by supporting the installation of a network of electric car charging stations.

Predicted Level of Implementation

San Clemente will support any electric vehicle charging stations by providing signs that designate parking for electric vehicles.

Land Use Measure 6: Encourage Planting of New Trees

San Clemente will encourage the planting of new trees in both residential and commercial areas, with a special emphasis in parking lots. Planting trees sequesters CO2. Therefore, increasing the citywide tree canopy will contribute to efforts to reduce GHG emissions and will have the added benefit of improving public spaces. Special note: This measure was not quantified at the time of this project (2009) as the Urban Forest Project Protocol was under development and was not a commonly accepted protocol utilized in municipal inventories. However, the City will re-visit the applicability of this Protocol during the next carbon re-inventory.

Predicted Level of Implementation

CO2 reduction varies by the number and type of trees planted.

Energy Efficiency Measures

The strategies in this section address San Clemente's second-largest source of emissions: the use of electricity and natural gas. Natural gas use accounts for 11 percent of total community emissions, while electricity use accounts for an additional 17 percent. This 28 percent of emissions represents the energy used to heat and power homes and businesses. Efficiency and reduction in this area and is critical to achieving the city's emissions reductions goals.

The residential sector in the City of San Clemente accounts for about 9 percent of electricity use and 9 percent of natural gas use. Much of this consumption is associated with existing buildings. The following measure estimates the energy and greenhouse gas reductions associated with implementing energy efficiency retrofits in single family and multi-family homes. The commercial sector accounts for 7 percent of electricity use and 2 percent of natural gas use in the City of San Clemente. Much of this is associated with existing buildings.

Energy Efficiency Measure 1: Adopt a voluntary Residential and Commercial Retrofit Energy Conservation Policy

The calculations assume 10 percent of existing residential homes are retrofit to reduce energy use by 30 percent per unit by 2020, and 15 percent of existing residential homes are retrofit for an energy savings of 30 percent per unit by 2030. The calculations assume 10 percent of existing non-residential square footage is retrofit to reduce energy use by 30 percent per square foot by 2020, and 15 percent of existing non-residential homes are retrofit for an energy savings of 30 percent per unit by 2030. The average cost of a residential retrofit that achieves 50 percent energy savings is $20,000. Rebate programs that reduce the initial cost and/or retrofit financing programs will be necessary to achieve the City's target participation.

Energy Efficiency Measure 2: Adopt a voluntary Residential and Commercial New Construction Energy Conservation Policy that would become mandatory only if necessary participation is not achieved by 2016

The program would encourage energy efficiency standards above current State energy standards. Under this option the City would adopt voluntary energy efficiency standards for new construction higher than current Title-24. The program would apply to residential and commercial. It would require new construction to exceed Title-24 energy efficiency standards by 15 percent, a level comparable to GreenPoint minimum requirements, Energy Star Rated Homes, and achieving the California Green Building Code Tier I performance criteria. The City calculations assume that 15 percent of residential projects participate through 2016 and then 100 percent of projects participate through 2020 (assuming that the anticipated level of is not achieved by 2016).

Energy Efficiency Measure 3: Promote the California Solar Initiative's Solar Water Heating Incentive Program to subsidize the purchase of solar water heaters and replace/ recycle old water heaters in homes and commercial buildings

The City estimate assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. We further assume that 40 percent offset electric water heaters and 60 percent of the systems offset natural gas water heaters. This would be part of the Energy Efficiency Policy mentioned above. On January 21, 2010, the CPUC approved a Decision creating the CSI-Thermal Program, which allocates significant funding to promote solar water heating (SWH) through a program of direct financial incentives to retail customers, training for installers and building inspectors, and a statewide marketing campaign.

Waste Reduction Measure

Solid waste accounts for approximately 1 percent of the all community emissions.

Adopt a Waste Diversion Ordinance that would require waste diversion of 75 percent by 2020 and 90 percent by 2030

The City of San Clemente estimates baseline citywide waste is 50,571 tons per year with 71 percent of total waste diverted from landfill and/or recycled. The City is targeting a 75 percent diversion rate by 2020 and 90 percent diversion rate by 2030. This would be accomplished by adopting an ordinance that requires the contracted waste haulers to achieve and demonstrate the prescribed reduction rates.

On the following page, Table 3.1 provides GHG Emissions Reduction Values by Measure for 2020 and 2030. The numeric values are represented in carbon dioxide equivalents.

Table 3.1: Total GHG Emissions Reductions

	2020		2030	
	MT CO_2e Reduction	% of total Reduction	MT CO_2e Reduction	% of total Reduction
Measure 1: Alternative Transportation				
1.1 Combined Transportation Measures	4,200	5%	4,223	2%
Measure 2: Energy Efficiency				
2.1 Residential Efficiency Retrofits	3,487	3%	8,746	3%
2.2 Commercial Efficiency Retrofits	1,796	2%	4,549	2%
2.3 Residential New Construction Efficiency	2,044	2%	6,216	2%
2.4 Commercial New Construction Efficiency	1,611	1%	4,900	2%
2.5 Residential Solar Water Heaters	5,505	5%	19,342	7%
Measure 3: Waste Reduction				
3.1 Expand Waste Material Diversion	1,538	1%	2,156	1%
Total Local Reduction Strategies	**20,181**	**18%**	**70,313**	**26%**
State Reduction Measures				
CA Renewable Portfolio Standard	40,894	37%	40,894	15%
CA Electricity Energy Efficiency Standards	5,487	5%	16,071	6%
CA Natural Gas Efficiency Standards	1,361	1%	6,064	2%
CAFE (Pavley) & LCFS	37,903	35%	41,758	16%
Water Conservation Program	3,372	3%	3,372	1%
Total State Reduction Measures	**89,018**	**82%**	**197,177**	**74%**
Total GHG Emission Reductions	**109,199**	**100%**	**267,490**	**100%**

Legend for Implementation Tables

Measure = Description of greenhouse gas emission reduction action.

Lead Department = Responsible City party for ensuring implementation.

Implementation Mechanisms = Regulatory and/or policy mechanisms to implement the GHG reduction measure and related target.

Implementation Phase = Implementation time frame broken into three distinct phases of 2016; 2020; and 2030.

Alternative Transportation

Expand Pedestrian Network

Responsibility:

Public Works and
Community Development

Phases:

2016	2020	2030
	☒	

Implementation Actions:

The Bicycle and Pedestrian Master Plan, which contains the following policies that identify gaps in the network and prioritize construction activities:

- The City will prepare and maintain an inventory of sidewalk facilities to determine where pedestrian improvements are most needed to insure a continuous safe route for pedestrians throughout San Clemente.
- The City will continue to identify and repair sidewalks and public areas that have pedestrian hazards.
- The City will work towards closing existing gaps in San Clemente's pedestrian network.
- The City will identify weak links and discontinuities in the existing network and develop a plan to prioritize and fund solutions that improve or complete links.

Alternative Transportation

Require Bicycling Parking

Responsibility:

Community Development

Phases:

2016	2020	2030
☒		

Implementation Actions:

One way to facilitate bicycle travel is to require bicycle parking for both public and private uses. This strategy would identify additional opportunities to place public use bicycle parking or to modify parking requirements for bicycle with the aim of increasing the supply of parking.

This strategy applies to selected new developments within the City which are larger than an identified threshold in terms of building size, number of employees, or other applicable criteria.

Alternative Transportation

Develop Off-Street Bicycle Facilities

Responsibility:

Public Works and
Community Development

Phases:

2016	2020	2030
	☒	

Implementation Actions:

Another means to encourage bicycle travel is to develop and implement off-street bicycle trails which can be used for both recreational travel and commuting purposes.

Some potential strategies that would be included in this category would include requiring buildings of certain size or adjacent to bikeways to include off-street bicycle paths or lanes in their plans and to construct them as part of their project approval.

Alternative Transportation

Incorporate Bike Lane Street Design

Responsibility:

Public Works and
Community Development

Phases:

2016	2020	2030
		☒

Implementation Actions:

The City's Bicycle and Pedestrian Master Plan incorporates bicycle lanes, routes, and shared-use paths into street systems, new subdivisions, and large developments. These on-street bike accommodations will be created to provide a continuous network of routes, facilitated with markings and signage.

The Bicycle and Pedestrian Master Plan, which will identify gaps in the network and prioritize bike lane siting and striping.

Alternative Transportation

Encourage the Use of Electric Vehicles

Responsibility:

Community Development
and Public Works

Phases:

2016	2020	2030
☒		

Implementation Actions:

Consider designation and establishment of EV charging stations in applicable City projects. Consider development requirements for designation of preferential parking spaces and related plug-in chargers in public parking lots to support electric vehicle (EV) use and EV charging opportunities.

Land Use

Encourage Planting of New Trees

Responsibility:

Community Development and Public Works

Phases:

2016	2020	2030
	☒	

Implementation Actions:

Consider opportunities to plant trees in residential and commercial areas, with an emphasis on parking lots.

Energy Efficiency

Residential and Commercial Retrofit Energy Conservation Policy

Responsibility:

Planning and Building Department

Phases:

2016	2020	2030
	☒	☒

Implementation Actions:

Develop a Residential and Commercial Retrofit Energy Efficiency and Conservation Policy that is voluntary.

Energy Efficiency

Residential and Commercial New Construction Energy Conservation Policy

Responsibility:

Planning and Building Departments

Phases:

2016	2020	2030
☒		

Implementation Actions:

Develop a Residential and Commercial New Construction Energy Efficiency and Conservation Policy that is voluntary. If participation rates are not met, investigate converting to a mandatory ordinance.

Energy Efficiency

Promote the California Solar Initiative's Solar Water Heating Incentive Program

Responsibility:

Planning and Building Departments

Phases:

2016	2020	2030
	☒	☒

Implementation Actions:

Develop a Residential and Commercial Retrofit Energy Efficiency and Conservation Policy that is voluntary.

Waste Reduction

Waste Diversion Ordinance

Responsibility:

Public Works and Community Development

Phases:

2016	2020	2030
	☒	☒

Implementation Actions:

Adopt a Waste Diversion Ordinance that would require waste diversion of 75 percent by 2020 and 90 percent by 2030.

4

Conclusion

This Climate Action Plan represents the City of San Clemente's commitment to fighting global climate change by reducing greenhouse gas emissions from both municipal operations and community activities. Though climate change presents a daunting challenge for people and businesses, San Clemente's actions to combat climate change represent local action that is a powerful tool in meeting this challenge.

In addition to the global benefits of climate action, the citizens of San Clemente will benefit from the public health protection and sustainable economic development afforded by the strategies adopted in the CAP. These strategies create public health benefits by reducing pollution of resources like air and water, which are two basic necessities for life with direct impacts on human health, and by reducing potential disruptions to the climate system that protect people from extreme weather events.

Finally, although the government of San Clemente is taking action against climate change, community action is critical to achieving emissions reductions goals that support physical well-being and economic vitality. By building on the framework set out in this Climate Action Plan, the citizens of San Clemente have the tools to build a community that not only creates a sustainable, healthy environment for itself, but which also allows other communities around the world to enjoy the same rights.

5

Glossary of Terms and Acronyms

Baseline: The baseline serves as a reference point to assess changes in greenhouse gas emission from year to year. According to the California Air Resources Board (CARB), in general, Baseline Actual Emissions as of a particular date shall equal the average rate, in tons per year, at which the unit actually emitted the pollutant during a two-year period which precedes the particular date and which is representative of normal source operation. For purposes of creating the baseline emissions, local governments estimate emissions from government operations and community-level.

Business-As-Usual (BAU): A scenario used for the projection of greenhouse gas emissions at a future date based on current technologies and regulatory requirements in absence of other reductions.

Carbon Dioxide (CO2): This is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1. It is naturally occurring and is also a primary by-product from combustion of fossil fuels and other industrial and agricultural processes.

Carbon Dioxide Equivalent (CO2e): This is a common unit for normalizing greenhouse gases with different levels of heat trapping potential. For carbon dioxide itself, emissions in tons of CO2 and tons of CO2e are the same, whereas for nitrous oxide and methane, stronger greenhouse gases, one ton of emissions is equal to 310 tons and 21 tons of CO2e respectively.

The California Environmental Quality Act (CEQA): This was a California statute passed in 1970, shortly after the United States federal government passed the National Environmental Policy Act (NEPA), to institute a statewide policy of environmental protection. CEQA does not directly regulate land uses, but instead requires state and local agencies within California to follow a protocol of analysis and public disclosure of environmental impacts of proposed projects and adopt all feasible measures to mitigate those impacts.

Climate: This is typically defined as the "average weather," or more rigorously, as the statistical description in terms of the average and variability of weather over a period of time ranging from months to thousands of years. These variables are most often temperature, precipitation, and wind. Climate can also refer to the global climate system.

Climate Change: Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change results from: 1) natural factors, such as changes in the sun's

intensity or slow changes in the Earth's orbit around the sun; 2) natural processes within the climate system (e.g. changes in ocean circulation); and 3) human activities that change the atmosphere's composition (e.g. through burning fossil fuels) and the land surface (e.g. deforestation, reforestation, urbanization, desertification, etc.).

Corporate Average Fuel Economy (CAFE): The CAFE standards were originally established by Congress for new automobiles, and later for light trucks, in Title V of the Motor Vehicle Information and Cost Savings Act. Under CAFE, automobile manufacturers are required by law to produce vehicles with composite sales-weighted fuel efficiency, which cannot be lower than the CAFE standards in a given year. Standardized tests are used to rate the fuel economy of new vehicles.

Energy Efficiency: This relates to a change in behavior in that the same function can be accomplished with less electricity. This usually requires newer equipment (such as televisions), different types of lighting (such as CFL bulbs) and other technology changes.

Energy Conservation: This is a typical practice using what you have more efficiently, such as shutting off the light or only using the dishwasher when it is full.

Emissions: The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

Forecast Year: Any future year in which predictions are made about emissions levels based on growth multipliers applied to the base year.

Global Warming: Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases.

Greenhouse Gas: Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO2), methane (CH4), nitrous oxide (NO2), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), ozone (O3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).

Intergovernmental Panel on Climate Change (IPCC): The IPCC was established jointly by the United Nations Environment Program and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social,

and economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences. With its capacity for reporting on climate change, its consequences, and the viability of adaptation and mitigation measures, the IPCC is also looked to as the official advisory body to the world's governments on the state of the science of the climate change issue. For example, the IPCC organized the development of internationally accepted methods for conducting national greenhouse gas emission inventories.

Measures: Any action taken to reduce GHG emissions.

Mitigation: This is putting in place enforceable plans, policies, and programs to reduce GHG emissions now in order to slow the rate of increase in the atmosphere. Successful mitigation at local, national and international levels will reduce the impacts of a changing climate for future generations. This is the legacy we leave.

Metric Ton (MT): Common international measurement for the quantity of greenhouse gas emissions. A metric ton is equal to 2205 lbs. or 1.1 short tons.

Sector: A term used to describe emission inventory source categories for greenhouse gases based on broad economic sectors.

Target Year: The year by which the emissions reduction target should be achieved.

Vehicles Miles Traveled (VMT): This unit measures the aggregate mileage traveled by all vehicles in a specific location. VMT is a key measure of street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve air quality goals. The transportation sector is the top GHG emitter in California, contributing roughly 40% of all California emissions. Poor fuel efficiency and high vehicle miles traveled (VMT) are primary contributors to transportation sector GHG emissions. Meeting California's GHG emissions reduction goals requires reductions in both per-mile emissions (often measured in as a vehicle's miles per gallon performance) and vehicle miles traveled. Fuel efficiency has been addressed historically by the federal Corporate Average Fuel Economy (CAFE) standards, and California has passed its own legislation regulating GHG emissions from vehicles. The number of miles traveled has ramifications on insurance premiums, but there has not been and likely will not be any legislative action to curb VMT even though it is growing at a much faster rate than population or the economy.

Acronyms

AB - Assembly Bill
APCD – Air Pollution Control District
CACP - Clean Air and Climate Protection Software
CAP - Climate Action Plan
CAPPA - Climate and Air Pollution Planning Assistant
CARB - California Air Resources Board
CEC - California Energy Commission
CEQA - California Environmental Equality Act
CH4 - Methane
CO2 - Carbon dioxide
CO2e - Carbon dioxide equivalent
EPA - U.S. Environmental Protection Agency
GHG - Greenhouse gas
HFC - Hydrofluorocarbons
HVAC - Heating, ventilating, and air conditioning
IPCC - Intergovernmental Panel on Climate Change
KWh - Kilowatt-hours
LCFS - Low Carbon Fuel Standard
MMT - Million metric tons
MW - Megawatt
NO2 - Nitrous oxide
PPM - Parts per million
SB - Senate Bill
TOD - Transit oriented development
USGBC - U.S. Green Building Council
VMT - Vehicle miles traveled

APPENDICES

City of San Clemente Climate Action Plan

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Memorandum

To	Tom Bonigut	Page	1
CC			
Subject	City of San Clemente Community and Municipal Greenhouse Gas Emissions Inventory		
From	Whitney Leeman and Chandra Krout		
Date	March 11, 2011		

This memorandum presents the City of San Clemente's (City's) greenhouse gas (GHG) emissions inventory for community-wide and local government operations. The purpose of the GHG emissions inventory is to identify source types, distribution, and overall magnitude of GHG emissions to enable policy makers to implement cost-effective GHG-reduction strategies in policy areas over which they have operational or discretionary control.

AECOM has developed a GHG emissions inventory (inventory) for community and municipal GHG emission sources for the 2009 base year for the City. This inventory will be used to support the City's Climate Action Plan (CAP).

GREENHOUSE GAS EMISSIONS INVENTORY

Overview

A GHG inventory is an accounting of the quantities of GHGs emitted by various sources over a specific period of time. The inventory is often developed by local governments and used in larger planning documents called climate action plans (CAPs) that provide estimates of baseline GHG emissions, business-as-usual projections, and measures to reduce future emissions, generally in conformance with the Global Warming Solutions Act of 2006 (AB 32).

Inventories for the community and local government operations were developed for the City, and each inventory is broken down into emissions sectors. An emissions sector is a distinct subset of a market, society, industry, or economy, whose components share similar characteristics. The 2009 inventory was compiled for the following emission sectors: energy consumption (electricity and natural gas use), on-road transportation, solid waste, water use and wastewater treatment. Government-related GHG emission sources can be considered a subset of the communitywide emissions inventory, and a municipal inventory typically comprises a small fraction of a communitywide inventory.

This inventory focuses on the three GHGs most relevant to communitywide and municipal operations: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Converting emissions of non-CO_2 gases to units of CO_2e allows GHGs to be compared on a common basis (i.e. on the ability of each GHG to trap heat in the atmosphere). Non-CO_2 gases are converted to CO_2e using internationally

recognized global warming potential (GWP) factors. GWPs were developed by the Intergovernmental Panel on Climate Change (IPCC) in its Third Assessment Report (TAR) to represent the heat-trapping ability of each GHG relative to that of CO_2. For example, the 100-year GWP of CH_4 is 23 because one metric ton of CH_4 has 23 times more ability to trap heat in the atmosphere than one metric ton of CO_2, on a 100-year timescale. The GWP of N_2O is 296.

Baseline Year

Reporting GHG inventories on a calendar year basis is a standard practice; the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, The European Union Emission Trading System (EU ETS), The California Climate Action Registry (CCAR), The Climate Action Reserve, and the state of California's mandatory reporting regulation under AB 32 all require GHG inventories to be tracked and reported on a calendar year basis. The City's community and municipal inventories were prepared for the year 2009.

Inventory Approach

The municipal inventory was prepared using the Local Government Operations Protocol (LGOP) which was developed by the California Air Resources Board (ARB), California Climate Action Registry (CCAR), and Local Governments for Sustainability (ICLEI), in collaboration with The Climate Registry (ARB 2010). The LGOP is designed to provide a standardized set of guidelines to assist local governments in quantifying and reporting GHG emissions associated with their government operations. The LGOP strongly encourages local governments to utilize operational control when defining their organizational boundary. The LGOP states that operational control most accurately represents the emission sources that local governments can influence. Operational control is also the consolidation approach required under AB 32's mandatory reporting program and is consistent with the requirements of many other types of environmental and air quality reporting. This inventory was prepared using the operational control approach.

Currently, there is no standard community emissions protocol; however, many documents have been developed to guide development of community GHG inventories. The boundary for defining community emissions is generally the physical geographic boundary of the community. The community inventory, then, will include governmental, residential, industrial, and commercial activities. While the geographic definition of a community's boundary works well for direct emissions (i.e. GHGs emitted from within the City's boundaries), indirect source emissions produced outside the City's boundarides (such as those resulting from imported electricity and water) and mobile source emissions are more challenging. Methodologies for estimating emissions from each sector are described below.

Unlike local pollutants such as diesel exhaust, it is unimportant where GHGs are actually released, because of their long atmospheric lifetimes and subsequent impact on global climate change; the important issue is reducing overall GHG emissions under the City's operational control by reducing fossil fuel combustion through conservation or low-carbon energy alternatives.

Methodology

City staff and AECOM collected data from various sources, including City departments, public utilities, and private entities that provide services to and within the community. Data collection included activities specific to municipal operations (e.g. local government energy use, vehicle fuel use/mileage, water use, and solid waste disposal) and communitywide activities (e.g., total citywide energy use, vehicle miles traveled (VMT), solid waste disposal, water use, and wastewater generation) that occurred in 2009.

AECOM used emissions factors recommended by the CCAR, the California Energy Commission (CEC), the US Environmental Protection Agency (EPA), the Intergovernmental Panel on Climate Change (IPCC), among others, to estimate CO_2e emissions for municipal operations and communitywide activities. Emission factors are continually being refined and improved to reflect better measurement technology and research.

Energy Consumption – Electricity and Natural Gas

The energy consumption sector includes electricity and natural gas use by residential, commercial, and industrial establishments within the legal boundaries of the city. Although emissions associated with electricity production are likely to occur in a different jurisdiction, consumers are considered accountable for the generation of those emissions. Electricity-related GHG emissions are considered indirect emissions. Indirect emissions are those that are generated as a result of activities occurring within the jurisdiction, but are released in different geographic areas. For example, a (city) resident may consume electricity within the city, but the electricity may be generated in a different region. Direct emissions are those occurring where they are generated (e.g., natural gas combustion for heating or cooling).

San Diego Gas and Electric (SDG&E) provided electricity consumption data in kilowatt-hours pr year (KWh/yr) and Sempra Energy provided natural gas consumption data in therms per year (therms/yr). These two entities provide all electricity and natural gas to San Clemente.

Electricity-related GHG emissions were quantified using an SDG&E-specific emission factor for CO_2 from the Climate Registry for 2008. Emission factors for CH_4 and N_2O were obtained from the CCAR protocol (2008 statewide averages). Emissions factors for CO_2, CH_4, and N_2O for natural gas were obtained from the CCAR protocol.

Transportation

The transportation sector includes the operation of on-road vehicles. Emissions from mobile combustion can be estimated based on vehicle fuel use and/or miles traveled data in conjunction with either fuel-specific emission factors from CCAR, or VMT-specific emission factors from EMFAC 2007 (see subsequent discussion). CO_2 emissions, which account for the majority of emissions from mobile sources, are directly related to the types and quantities of fuel combusted and thus can be calculated using fuel consumption data. CH_4 and N_2O emissions are more dependent on vehicular emissions control technologies and distance traveled. The calculation of CH_4 and N_2O emissions requires data on vehicle characteristics (which takes into account emission control technologies) and vehicle miles traveled (VMT).

Communitywide VMT, as well as City employee commute data were provided by the traffic consultant, Fehr & Peers. Details on the methodology can be found in the Fehr and Peers Memorandum dated March 3, 2011 titled *VMT Estimates for San Clemente Climate Action Plan.* This Memorandum can be found at the end of this document. The City provided total fuel consumption and VMT data for the City vehicle fleet for fiscal year 2008/2009.

Emissions factors for the transportation sector were obtained using ARB's vehicle emissions model, EMFAC2007. EMFAC2007 is a mobile source emissions model for California that provides vehicle emission factors by pollutant, county, vehicle class, and mode of operation. For the 2009 mobile emissions inventory, VMT and CO_2 emissions factors from EMFAC (for the Orange County fleet mix) were used for the communitywide inventory, and fuel consumption and CCAR emissions factors were used for the municipal inventory (for the City fleet mix).

Solid Waste

The solid waste sector includes emissions associated with the collection, processing, and disposal of solid waste. Fugitive CH_4 emissions are released from solid waste facilities, namely landfills that accept organic waste. Emissions generated from solid waste disposal are primarily CO_2, which occur under aerobic conditions, and CH_4, which are generated under anaerobic conditions. Biogenic CO_2 emissions are considered part of the short-term carbon cycle, and are not included in GHG emissions inventories.

Community and government-generated solid waste data were provided by the City. GHG emissions associated with solid waste collected from the community and local government were estimated using EPA's Waste Reduction Model (WARM) model and waste characteristics from the California Department of Resources Recycling and Recovery (CalRecycle).

Wastewater

The wastewater sector generates fugitive CH_4 emissions associated with wastewater treatment processes, including primary and secondary treatment, sludge digestion and N_2O emissions associated with effluent discharge. CO_2 emissions associated with energy needed to treat wastewater are included in the "water" sector. As mentioned previously, biogenic CO_2 emissions associated with wastewater treatment are not counted in GHG emissions inventories.

Wastewater inflows and biochemical oxygen demand (BOD, used as an indicator of CH_4 generation potential) to the City plant and to Santa Marigarita Water District were provided by the City for the year 2009. Local government wastewater generation rates for use in the municipal inventory were not available separately; however, municipal wastewater emissions are accounted for in the communitywide inventory.

GHG emissions associated with wastewater treatment were calculated using IPCC methodology for centralized, aerobic wastewater treatment plants. (IPCC 2006).

Water Consumption

The water sector includes emissions from energy associated with water treatment, distribution, and conveyance of water to the City, as well as wastewater treatment and discharge.

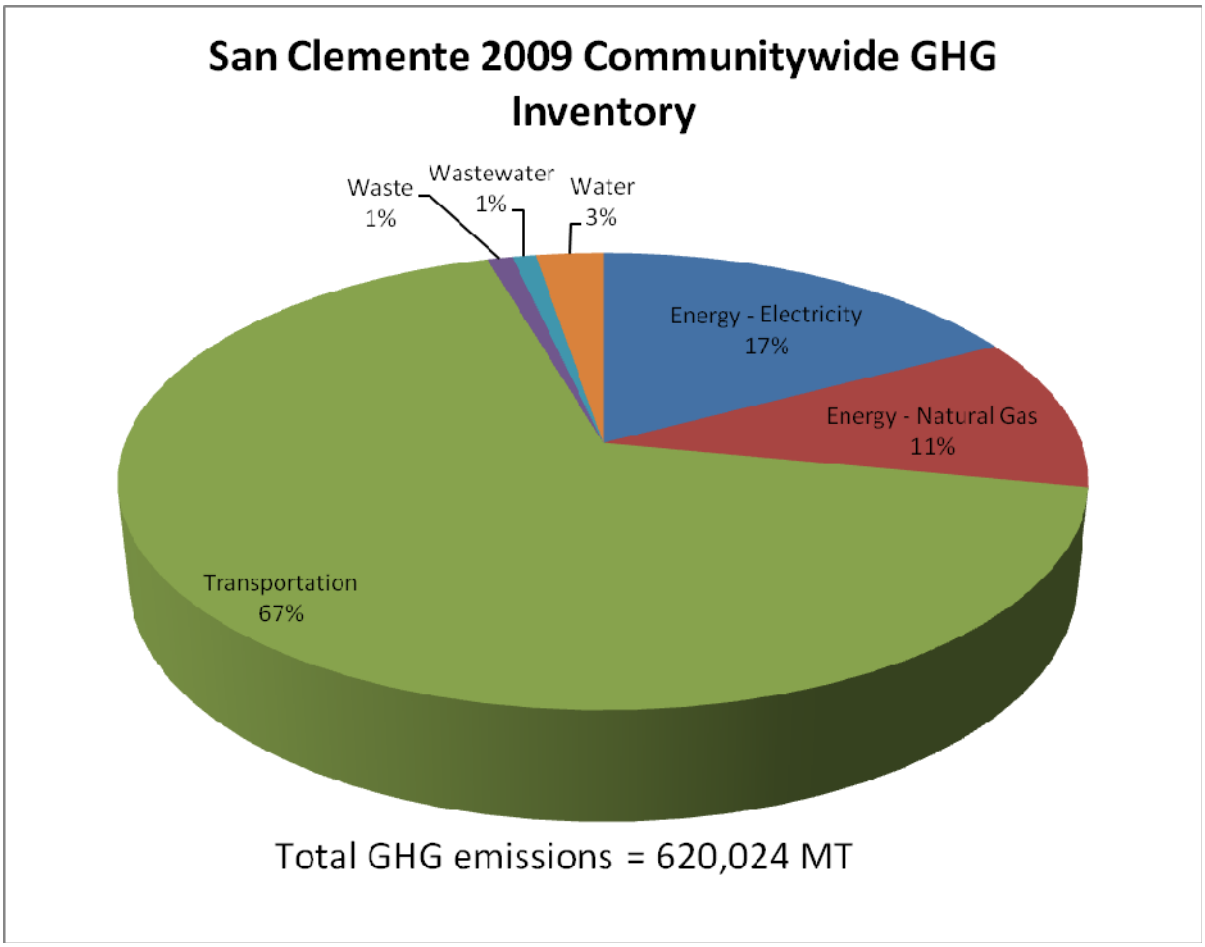
Water for the City is provided by local (well) sources, as well as imports and recycled water. Approximately 16% of the City's water production/consumption is from local sources (8% recycled water and 8% groundwater).

The California Energy Commission (CEC) has published water-energy intensity reports that provide estimates of the energy required for conveyance, treatment, and distribution of water, as well as treatment and discharge of wastewater. Many communities of Southern California must import their water supplies hundreds of miles from remote locations via the Colorado River and Northern California canals and pipelines. The conveyance and distribution of water from these remote locations involves a high electricity demand factor for the City's water imports. However, the local source of water from the City's water department does not require long-distance conveyance, and therefore the energy demand from local sources is much lower. An energy factor for local water sources was obtained from Electric Power Research Institute (EPRI).

In addition, all water is treated to be potable, but water used in outdoor activities, such as landscape irrigation, is not subject to wastewater treatment, and therefore energy demand associated with wastewater treatment is not included outdoor water consumption estimates. An average emissions factor from the CEC was used to account for both indoor and outdoor water uses.

Results

Reporting emissions by sector provides a useful way to understand the sources of both communitywide and municipal emissions. By better understanding the relative scale of emissions from each of the sectors, the City can more effectively focus emissions reductions strategies to achieve the greatest emissions reductions. **Mobile sources and energy consumption are the largest contributors to the City of San Clemente's 2009 communitywide GHG inventory. The transportation and energy sectors account for approximately 67% and 28% of the total 620,024 MT CO_2e/yr, respectively**. The next largest emissions sector is water use, which accounts for approximately 3% of the total communitywide emissions in 2009. The contributions of solid waste and wastewater each contributed less than 1% of the total.



DISCUSSION

As may be seen in Table 1, the largest sources of GHG emissions for 2009 are the following, in descending order:

1. Transportation (67%)
2. Electricity consumption (17%)
3. Natural gas consumption (11%)
4. Water consumption (3%)

The remaining sources, comprising 2% of total 2009 GHG emissions, are similar in magnitude:

1. Solid waste disposal
2. Wastewater generation

The City will likely be able to achieve the largest, most cost-effective emissions reductions from VMT reduction and energy conservation-related GHG reduction measures, which will be strong focus areas within the CAP. Per-capita emissions for the City were 10 MT CO_2e/person in 2009.

Table 1. City of San Clemente 2009 Communitywide GHG Emissions		
Sector	**MT CO_2e**	**%**
Transportation	417,740	67%
Energy		
Electricity	106,871	17%
Natural Gas	67,249	11%
Water	16,350	3%
Solid Waste	6,115	1%
Wastewater	5,699	1%
Total	**620,024**	**100%**

Municipal operations within the City during 2009 contributed 5,995 MT CO_2e, which less than 1% of the total communitywide GHG emissions. The primary source of municipal GHG emissions was energy consumption (Table 2). Therefore, City will likely be able to achieve the largest, most cost-effective emissions reductions from energy conservation-related GHG reduction measures.

Table 2. City of San Clemente Municipal GHG Emissions 2009		
Sector	**MT CO_2e**	**%**
Energy		
Electricity	4,264	71%
Natural Gas	300	5%
Transportation		
Vehicle Fleet	619	10%
Employee Commute	448	7%
Solid Waste	184	3%
Water	180	3%
Total	**5,995**	**100%**[1]

[1]Total may not add to 100% due to rounding.

AECOM

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FEHR & PEERS

MEMORANDUM

Date: March 3, 2011

To: Chandra Krout - AECOM

From: Chris Gray - Fehr & Peers

Subject: ***VMT Estimates for San Clemente Climate Action Plan***

IE11-0061

The purpose of this memorandum is to provide VMT estimates for use in developing the San Clemente Climate Action Plan. These estimates include existing year community wide VMT and also City Employee VMT for both existing and future years.

VMT FORECASTS

According to Austin-Faust (who maintains the City of San Clemente's Travel Demand Model), the existing VMT for the City is 2,180,705 on a daily basis. Future Year VMT estimates will be forthcoming.

VMT ESTIMATES AND FORECASTS FOR CITY EMPLOYEES

Table 1 documents the VMT estimates obtained from our survey of City Employees. We employed the following process to obtain this information:

- From our survey, we determined that there were 106 persons who responded
- These 106 respondents indicated that they generally drove to the City offices and also traveled to the City offices a majority of the week. Nearly all respondents traveled to the City employee offices on a daily basis.
- We used data from questions related to vehicle miles traveled (VMT) for personal and City-owned vehicles to calculate a typical travel profile for City employees
- We then applied this travel profile to the existing number of employees
- We then

Table 1
City Employee VMT Estimates & Forecasts
2009-2035

Year	Number of City Employees	Private Vehicle VMT	City Owned Vehicle VMT	Total VMT (Private Vehicle + City Owned Vehicle)
2009	197	4,252	1,154	5,405
2020	206	4,403	1,195	5,598
2035	206	4,403	1,195	5,598

Source: Fehr & Peers, 2011

We hope you find this information helpful. Please contact Chris Gray (c.gray@fehrandpeers.com or 951-274-4801) if you have any questions or need more information from us at this time.

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Memorandum

To	Tom Bonigut	Page	1
CC			
Subject	City of San Clemente Greenhouse Gas Emissions Reduction Target		
From	Culley Thomas, Chandra Krout		
Date	March 17, 2011		

AECOM recommends that the City of San Clemente utilize the greenhouse gas (GHG) reduction targets contained in this memorandum to guide the development of the City's Climate Action Plan (CAP) and to demonstrate the jurisdiction's commitment to California's climate protection efforts. The memorandum describes (a) existing California climate change legislation and State guidance relevant to establishing a GHG reduction target, (b) recommended communitywide and municipal operations GHG reduction targets, and (c) the range of targets set by other California jurisdictions completing Climate Action Plans.

STATE LEGISLATION

California has adopted a wide variety of regulations aimed at reducing the State's GHG emissions. While State actions alone cannot stop global warming, the adoption and implementation of this legislation demonstrates California's leadership in addressing this challenge.

Executive Order S-3-05

Executive Order (EO) S-3-05 states that California is vulnerable to the effects of climate change, including reduced snowpack in the Sierra Nevada Mountains, exacerbation of California's existing air quality problems, and sea level rise. To address these concerns, the executive order established statewide targets to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050.

Assembly Bill 32 and Climate Change Scoping Plan

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, requires California to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 directs ARB to develop and implement regulations that reduce statewide GHG emissions. The Climate Change Scoping Plan (Scoping Plan) was approved by ARB in December 2008 and outlines the State's plan to achieve the GHG reductions required in AB 32. The Scoping Plan contains the primary strategies California will implement to achieve a reduction of 169 million metric tons of carbon dioxide equivalent, or approximately 28% from the State's projected 2020 emission levels.

In the Scoping Plan, ARB encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for communitywide emissions that parallel the State commitment to reduce GHGs. The Plan identifies California's cities and counties as "essential partners" within the overall statewide effort and recommends that local governments set a GHG reduction target of 15 percent below 2005-2008 levels by the year 2020. Though the specific role local governments will play in meeting the State's GHG reduction goals is still being defined, they will nonetheless be a key player.

Senate Bill 375
Additionally, Senate Bill (SB) 375 established a process whereby regional targets for reduced passenger vehicle and light duty truck GHG emissions have been established for each Metropolitan Planning Organization (MPO) in the state, including the Southern California Association of Governments (SCAG). The Air Resources Board adopted targets for the SCAG region include an eight percent per capita reduction by 2020 and a 13 percent per capita reduction by 2035. It should be noted that this is a regional target and not necessarily a target for each member jurisdiction.

Senate Bill 97
Senate Bill (SB) 97 acknowledges that climate change is a prominent environmental issue that requires analysis under the California Environmental Quality Act (CEQA). Pursuant to SB 97, the State CEQA Guidelines were updated in 2010 to include provisions for mitigating GHG emissions and/or the effects of GHG emissions. The amended CEQA Guidelines (Section 15183.5) allow jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level by adopting a plan for the reduction of GHG emissions. Later, as individual projects are proposed, project specific environmental documents may tier from and/or incorporate by reference that existing programmatic review in their cumulative impacts analysis. If a plan is to be used for tiering or incorporation by reference purposes, it should contain enforceable reduction measures and demonstrate that it can reliably reduce the community's GHG emissions to a degree that contributes its fair share to State emissions reduction efforts (see Attorney General's guidance below).

Attorney General Guidance
In March 2009 correspondence to local governments completing General Plan updates, the State Attorney General's Office emphasized and expanded upon this recommendation by stating that communitywide targets should align with an emissions trajectory that reflects California's aggressive near term, interim (1990 levels by 2020), and long-term (80 percent below 1990 levels by 2050) GHG emissions limits set forth in AB 32 and Executive Order S-3-05.

The Attorney General's August 2009 letter to San Diego County states that GHG projections associated with a General Plan update should estimate the emission levels through the full planning horizon not just in 2020. Though the letter only explicitly calls for 2030 projections, it could be assumed that an emission reduction target for 2030 would also be required.

Summary of State Guidance on Local Government Targets
Table - 1 provides a summary of the State of California's guidance to local governments regarding GHG reduction targets. This guidance applies to both municipal operations and communitywide emissions reductions efforts.

TABLE - 1: Summary of State Guidance on Local Government Targets

Target Year	2020	Interim Year Between 2020-2050	2050
AB 32 Scoping Plan Recommended Target	15% below 2005-2008 levels	NA	NA
Attorney General's Office Guidance	15% below 2005-2008 levels	Demonstrate a trajectory toward 2050 levels (*e.g., 37.7% below 2005-2008 levels by 2030*)	80% below 1990 levels or 83% below 2005-2008 levels

RECOMMENDED GHG TARGETS FOR THE CITY OF SAN CLEMENTE

The City should select GHG emissions reduction targets that are effective and attainable. AECOM recommends that the City adopt the following 2020 and 2030 GHG reduction targets that conform to the State's guidance. Because 2009 serves as the year of the baseline inventory, the reduction targets are expressed as percent reductions below 2009 levels (see Appendix A for an approximate comparison to 1990 baseline targets). The targets would apply to both communitywide and municipal operation GHG reduction efforts.

2020 Target: 15 Percent below 2009 Levels

Selecting a reduction target that calls for GHG emissions to be 15 percent below 2009 levels by 2020 offers the following benefits:

- Consistent with current guidance offered by ARB and the California Attorney General's Office
- Demonstrates contribution to State AB 32 GHG emissions reduction goals for 2020

Attaining a 15 percent reduction below 2009 levels would require communitywide emissions to be reduced by approximately 93,004 MT CO_2e/year from existing levels by 2020. Municipal operations emissions would need to be reduced by approximately 901 MT CO_2e/year from existing levels by 2020.

2030 Target: 37.7 Percent below 2009 Levels

A target that strives to reduce GHG emissions to be 37.7 percent below 2009 levels by 2030 provides the following benefits:

- Consistent with the guidance offered by the California Attorney General's Office
- Demonstrates a trajectory toward the State's long-term (EO-S-3-05) emissions reduction goals
- Aligns with the City of San Clemente General Plan update planning horizon

Achieving the 37.7 percent reduction below 2009 levels would require communitywide emissions to be reduced by approximately 233,718 MT CO_2e/year from existing levels by 2030. Municipal operations emissions would need to be reduced by approximately 2,265 MT CO_2e/year from existing levels by 2030.

TABLE - 2: Recommended Communitywide Reduction Targets and Emission Levels 2020 and 2030

Year	Reduction Target % below 2009	Emission Level MT CO_2e/Year	Emission Reduction from 2009 Levels MT CO_2e/Year
2009	NA	620,024	NA
2020	15%	527,020	93,004
2030	37.7%	386,306	233,718

TABLE - 3: Recommended Municipal Operation Reduction Targets and Emission Levels 2020 and 2030

Year	Reduction Target % below 2009	Emission Level MT CO_2e/Year	Emission Reduction from 2009 Levels MT CO_2e/Year
2009	NA	6,008	NA
2020	15%	5,107	901
2030	37.7%	3,743	2,265

LOCAL GOVERNMENT TARGETS IN CALIFORNIA

While this memorandum recommends the City adopt the specific GHG reduction targets described above, the following section provides the City with insight into the range of targets that other California jurisdictions have adopted. As noted in the 2010 California Planner's Book of Lists published by the Governor's Office of Planning and Research, more than 50 California jurisdictions are in the process of adopting CAPs or similar plans and associated GHG reduction targets.

Local governments have established a diverse range of communitywide reduction targets. Among the numeric targets listed in Table - 4, Davis has set the highest 2020 communitywide GHG reduction target at carbon-neutral by 2020. Hayward has set the lowest communitywide GHG reduction target among participating jurisdictions at 12.5 percent below 2005 levels by 2020. The average 2020 reduction target among CA jurisdictions is approximately 22 percent below current levels.

TABLE - 4: Reduction Targets Adopted or Considered by Various California Jurisdictions

Jurisdiction	Target(s)	Conformance with State 2020 Recommended Reduction Levels
Hayward	6 % below 2005 levels by 2013 12.5% below 2005 levels by 2020 82.5% below 2005 levels by 2050	Lower than State Recommended Level
Sacramento (City)	1990 levels by 2020	Equivalent to State Recommended Level
Alameda County	15% below 2005 levels by 2020	
San Rafael	15% below current by 2020 80% below current by 2050	
Orange	15% below current levels by 2020	
Union City	25% below 2005 levels by 2020	Higher than State Recommended Level
Berkeley	33% below 2000 levels by 2020 80% below 2000 levels by 2050	
Santa Monica	15% below 1990 levels by 2015	
San Diego (City)	15% below 1990 levels by 2010	
San Francisco	20% below 1990 levels by 2012	
Chula Vista	20% below 1990 levels by 2010	
Petaluma	25% below 1990 levels by 2015	
Davis	Carbon-neutral by 2020	

While the majority of jurisdictions have selected 2020 as the target year for their CAPs, numerous jurisdictions have also established 2030, 2035, and 2050 targets. These long-term targets demonstrate a trajectory toward the goal expressed in Executive Order S-3-05 (80 percent below 1990 by 2050), and the understanding that reductions of this scale are needed to achieve climate stability.

Appendix A

Comparison of 1990 Baseline Targets vs 2009 Baseline Targets

Target Year	Percent below 1990 Emission Levels	Percent below 2009 Emission Levels
2020	**0.0%**	**15.0%**
2021	2.7%	17.3%
2022	5.3%	19.5%
2023	8.0%	21.8%
2024	10.7%	24.1%
2025	13.3%	26.3%
2026	16.0%	28.6%
2027	18.7%	30.9%
2028	21.3%	33.1%
2029	24.0%	35.4%
2030	**26.7%**	**37.7%**
2031	29.3%	39.9%
2032	32.0%	42.2%
2033	34.7%	44.5%
2034	37.3%	46.7%
2035	40.0%	49.0%
2036	42.7%	51.3%
2037	45.3%	53.5%
2038	48.0%	55.8%
2039	50.7%	58.1%
2040	53.3%	60.3%
2041	56.0%	62.6%
2042	58.7%	64.9%
2043	61.3%	67.1%
2044	64.0%	69.4%
2045	66.7%	71.7%
2046	69.3%	73.9%
2047	72.0%	76.2%
2048	74.7%	78.5%
2049	77.3%	80.7%
2050	**80.0%**	**83.0%**

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November 1, 2011

Ms. Chandra Krout
Principal, Krout and Associates
2321 Lincoln Avenue
San Diego, CA, 92104

Subject: City of San Clemente - Forecasting for 2020 and 2030

Dear Ms Krout:

This document presents information regarding the baseline and business-as-usual forecasted conditions for the City of San Clemente Greenhouse Gas (GHG) Inventory. Where possible, the data should be representative of the recommended forecast years 2020 and 2030 (build out of the upcoming General Plan Update) to comply with federal, state, and local regulations (i.e., AB 32 and SB 375).

This effort is a collaborative between the City of San Clemente, Krout and Associates, and Healthy Buildings.

Please contact me if you have any questions.

Thank you,

Lena Ohta, CRM, LEED AP
Sustainability Advisor, GHG Analyst
T: 949.450.1111
M: 949.371.3365
lohta@healthybuildings.com

Executive Summary

The City of San Clemente is a sustainability leader by understanding their greenhouse gas (GHG) emissions. Therefore, Healthy Buildings conducted a forecast emissions scenario under business-as-usual (BAU) conditions, which used available data on growth conditions within the City (community-wide and municipal). Healthy Buildings, under the guidance of K&A, determined growth conditions derived from historical trends in population, employees, energy consumption, and land use. This document outlines forecasts for 2020 and 2030 (build out of the upcoming General Plan Update) to comply with federal, state, and local regulations (i.e., AB 32 and SB 375).

The City quantified emissions and established a baseline emissions inventory for 2009 against which to measure future progress, and understand the scale of emissions from various sources. Forecast proxies integrated 2010 values to more accurately reflect economic conditions. During the baseline year, San Clemente's operational greenhouse gas emissions, expressed in terms of metric tons of carbon dioxide equivalent ($MTCO_2e$), totaled 625,555 $MTCO_2e$. For 2009, the majority of San Clemente's footprint was attributed to community transportation at 67% of the total CO_2e emissions, which is typical for most city inventories. Residential building energy usage contributes 18.5%, commercial/industrial building energy usage contributed 9.4%, and municipal building energy usage contributed 0.2%.

The City's community and municipal emissions are estimated to increased 0.8% from 2010 to 2020 and 0.8% from 2020 to 2030. The City anticipates an increase in community emissions by 0.3% for 2020 and 0.8% for 2030 using business-as-usual forecasting (Figure 3). Forecast emissions do not show a significant increase, because the population is expected to remain relatively consistent. Community transportation contributed 68% of community emissions. Municipal emissions consist of less than 1% of the inventoried baseline emissions. The City anticipates an increase in municipal emissions by 2.7% for 2020 and 0.3% for 2030 using business-as-usual forecasting. The estimated increase for 2020 is primarily based on developments of a sports park and fire station/senior center. Electricity for the water department contributes 45% of municipal emission for the baseline year.

The City of San Clemente carbon trends tell the story about its forecasts energy efficiency and environmentally responsible practices. Figure 1 and Table 11 Forecast Summaries show forecasted years 2020 and 2030 compared to the City's 2009 baseline. They identify each emission subsector's contribution and forecasting proxy. For community emissions, Healthy Buildings analyzed forecasting proxies including population change, commercial and/or industrial land usage, vehicles miles traveled and community job change. Municipal emissions were estimated using municipal area change, population, employee commuting, vehicle miles traveled and municipal employee counts. Tables 1-10 outline each forecasting year's based values, growth rate and source reference.

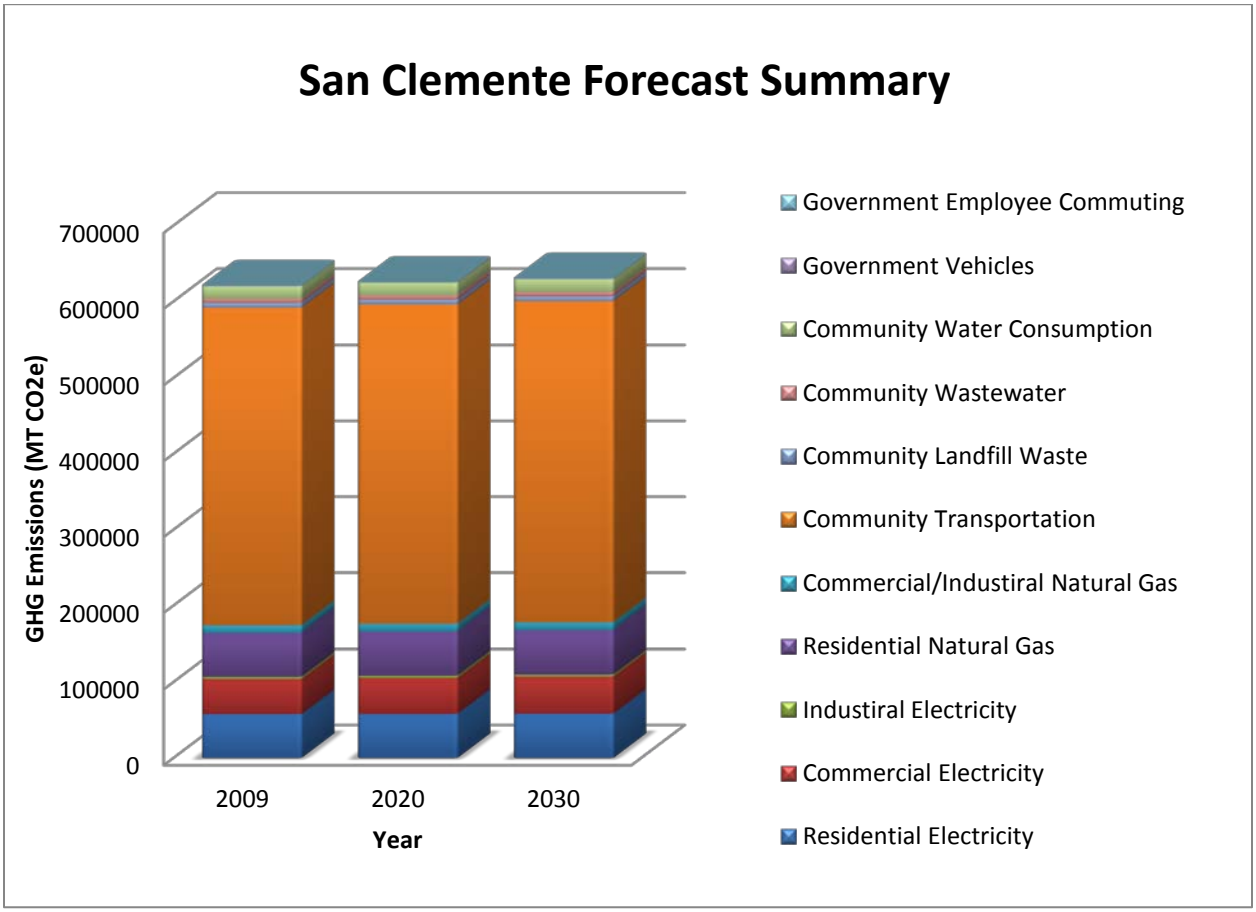

Figure 1. Total GHG emissions by source type and year

Community Forecasts

The City anticipates an increase in community emissions by 0.3% for 2020 and 0.8% for 2030 using business-as-usual forecasting (Figure 3). The contribution of each emission subsection and applicable forecast proxy is included in Table 12.

Population, job change, transportation, commercial and industrial land use data were taken from The Planning Center's citywide data Adopted and Preferred Tables, which reflected 2010 and projected 2030 populations respectively. Healthy Buildings interpolated 2020 estimates given consistent linear growth between 2010 and 2030. These values are consistent with the City of San Clemente's General Plan Update for 2030.

The Planning Center's data is believed to be a more accurate model than similar demographic resources. The Planning Center's model is explores city-specific statistics and individual developments. In an alternative model, Southern California Association of Governments (SCAG) Local San Clemente Profile 2011's Statistical Summary estimates use US Census Bureau, Nielson Co., Department of Finance, and MDA DataQuick based data. The Center for Demographic Research at Cal State Fullerton (CDR OCP 2006) population estimates that are based on California Department of Finance information.

Population change (Table 1) was used as a forecasting metric for residential electricity usage, natural gas usage, transportation, and landfill waste.

Year	Population	Change	Source Reference
2010	75,343	Baseline	The Planning Center Citywide Population, Adopted Table
2020	75,758	0.55%	The Planning Center Citywide Population, Data interpolated from Adopted and Preferred Tables
2030	76,173	0.55%	The Planning Center Citywide Population, Preferred Table

Table 1. Population Growth Rate

Commercial land use (Table 2) was used as a forecasting metric for commercial electricity usage.

Year	Commercial	Change	Source Reference
2010	14,385,104	Baseline	The Planning Center Adopted Citywide Population, Adopted Table - Data aggregated from office space, retail, and institutional quantities.
2020	14,771,304	3%	The Planning Center Adopted Citywide Population, data interpolated from Adopted and Preferred Tables
2030	15,157,505	3%	The Planning Center Adopted Citywide Population, Preferred

Table 2. Commercial Land Use Change

Industrial land use (Table 3) was used for industrial electricity usage.

Year	Industrial	Change	Source Reference
2010	3,007,941	Baseline	The Planning Center Adopted Citywide Population, Adopted Table
2020	2,929,451	-3%	The Planning Center Adopted Citywide Population, data interpolated from Adopted and Preferred Tables
2030	2,850,960	-3%	The Planning Center Adopted Citywide Population, Preferred

Table 3. Industrial Land Use Change

For commercial and industrial natural gas usage (Table 4), combined commercial and industrial land use was used as a forecasting metric. For combined commercial and industrial land use, Healthy Buildings aggregated the Planning Center's estimations for office, retail, industrial and institutional spaces.

Year	Commercial/ Industrial Area	Change	Source Reference
2010	17,393,046	Baseline	The Planning Center Adopted Citywide Population, Adopted Table - Data aggregated from office space, retail, industrial and institutional quantities.
2020	17,700,755	2%	The Planning Center Adopted Citywide Population, data interpolated from Adopted and Preferred Tables
2030	18,008,465	2%	The Planning Center Adopted Citywide Population, Preferred

Table 4. Non-Residential Land Use Change

Job change (Table 5) was used as a forecasting metric for wastewater and water consumption.

Year	Employees	Change	Source Reference
2010	37,671	Baseline	The Planning Center Adopted Citywide Population, Adopted Table
2020	38,411	1.96%	The Planning Center Adopted Citywide Population, data interpolated from Adopted and Preferred Tables
2030	39,150	1.93%	The Planning Center Adopted Citywide Population, Preferred

Table 5. Community Job Change

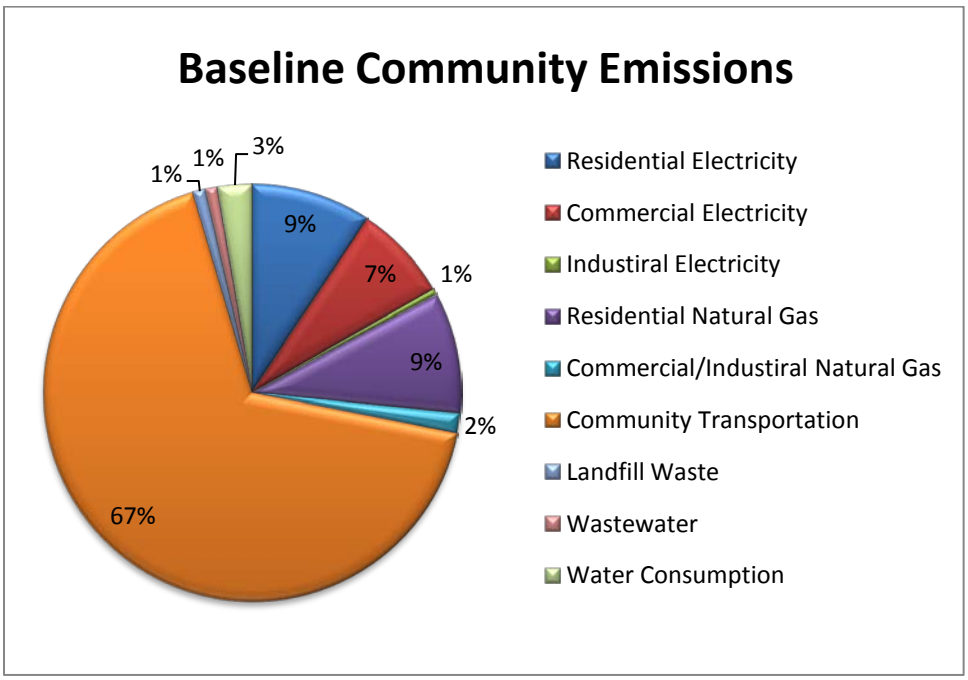

Figure 2. Baseline Community GHG emissions by source type

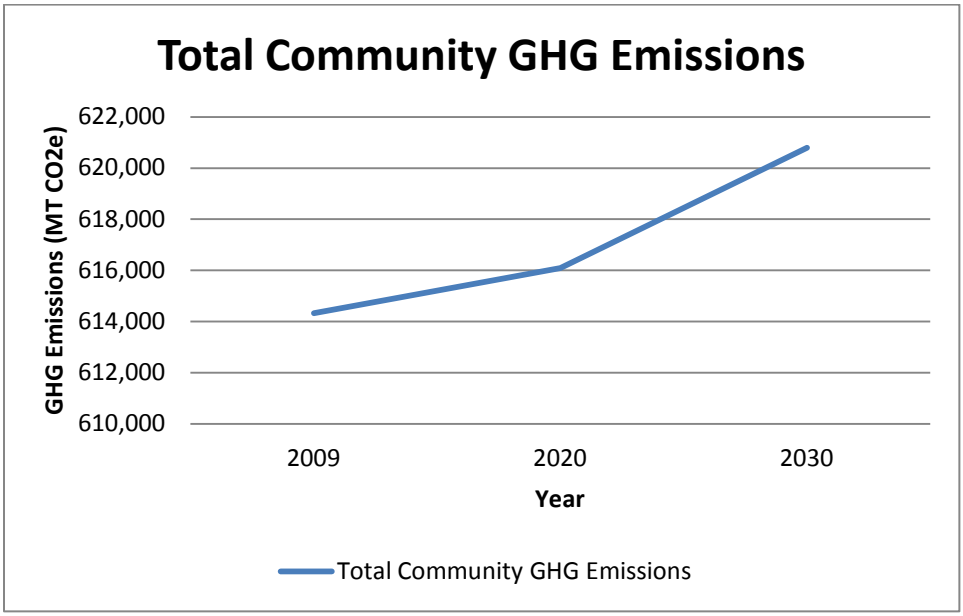

Figure 3. Total Community GHG emissions by forecast year

Municipal Forecasts

Municipal emissions consist of less than 1% of the inventoried baseline emissions. The City anticipates an increase in municipal emissions by 2.7% for 2020 and 0.3% for 2030 using business-as-usual forecasting (Figure 5). Electricity for the water department contributes 45% of municipal emission for the baseline year (Figure 4). Each emission subsection and applicable forecast proxy is included in Table 12.

Municipal area baseline and changes are shown in Table 7. Baseline municipal square footage was determined using the City of San Clemente CJPIA Property Schedule prepared by Alliant Insurance Services, Inc. and published October 7, 2011. Tom Bonigut, Assistant City Engineer for the City of San Clemente, provided an email on October 6, 2011 that summarized anticipated facilities including a sports park and fire station/senior center, shown in Table 6.

Property	Area (SF)	Anticipated Year
Fire Station Branch	7,851	2011
Senior Center Branch	7,963	2011
Soccer Restroom Building	1,271	2012
Baseball Restroom Building	1,271	2012
Aquatic Center, Main Building	7,677	2012
Aquatic Center, Equipment Building	1,936	2012
Courtney's Sand Castle Restroom Building	~400	2012
Anticipated 2020 Total	**28,368**	

Table 6. Future San Clemente Municipal Development including joint Fire Station-Senior Center and Sports Park Buildings

Year	Area	Change	Source Reference
2009	425,443	Baseline	City of San Clemente CJPIA Property Schedule, Prepared by Alliant Insurance Services, Inc., Published 10/7/11.
2020	453,811	6.67%	Tom Bonigut, Assistant City Engineer for the City of San Clemente, on 10/6/11
2035	453,811	0.00%	Same as above.

Table 7. Municipal Buildings and Facilities Area

Government employee counts, municipal transportation including government vehicles (Table 8) and employee commuting (Table 9) were based on Fehr & Peers Memorandum dated March 3, 2011. This travel profile was extrapolated based on a survey with 106 respondents from the City of San Clemente. Vehicle miles traveled were taken from Austin Faust, the individual who maintains the City's Travel Demand Model.

Year	City Owned Vehicle VMT	Change	Source Reference
2011	1,154	Baseline	Fehr & Peers, 2011, Table 1: City Employee VMT Estimates & Forecasts (2009-2030)
2020	1,195	3.55%	Same as above.
2035	1,195	0.00%	Same as above.

Table 8. Municipal Transportation – Government Vehicles

Year	Private Vehicle VMT	Change	Source Reference
2011	4,252	Baseline	Fehr & Peers, 2011, Table 1: City Employee VMT Estimates & Forecasts (2009-2030)
2020	4,403	3.55%	Same as above.
2035	4,403	0.00%	Same as above.

Table 9. Municipal Transportation – Employee Commuting

Tom Bonigut, Assistant City Engineer for the City of San Clemente, provided the raw employee counts in October 6, 2011 email, which specified 192 full time and 9 part time employees for 2009, and 0 full time and 14 part time employees for 2020/2030. Fehr & Peers Memorandum dated March 3, 2011 estimated these full time and part time employee counts into full time equivalents. Memorandum Table 1 shows City Employee VMT Estimates and Forecasts for 2009 to 2030, as shown in Table 10 below.

Year	Employee Count	Change	Source Reference
2011	197	Baseline	Tom Bonigut, Assistant City Engineer for the City of San Clemente - raw counts in 10/6/11 email; Fehr & Peers, 2011, Table 1: City Employee VMT Estimates & Forecasts (2009-2030) - Employee counts estimated into full time equivalents from full time and part time counts.
2020	206	4.57%	Same as above.
2030	206	0.00%	Same as above.

Table 10. Municipal Employee Counts

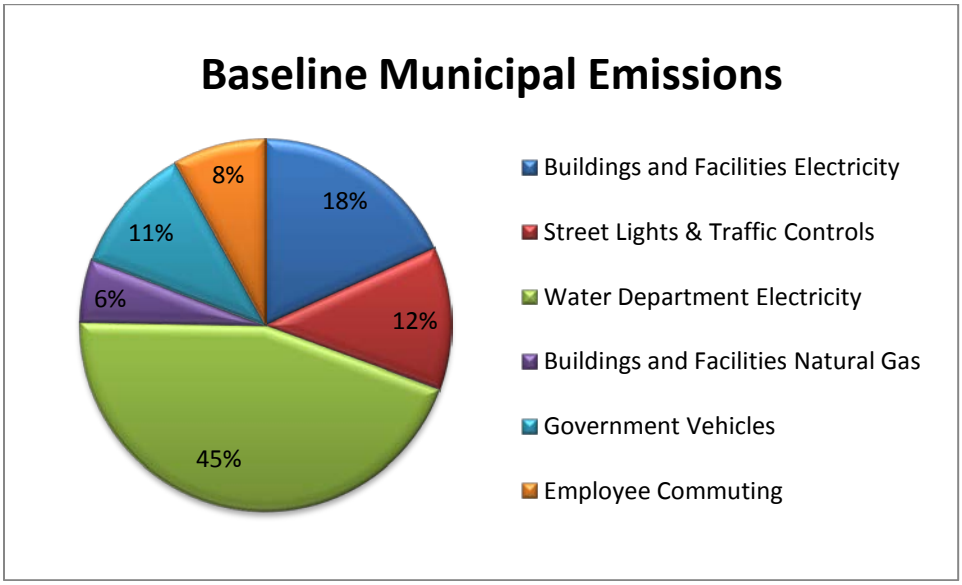

Figure 4. Baseline Municipal GHG emissions by source type

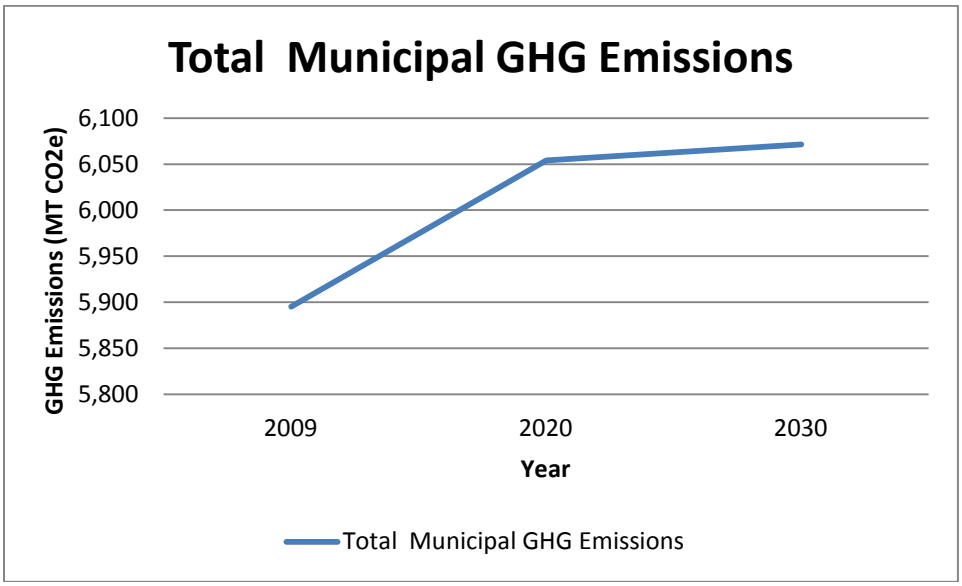

Figure 5. Total Municipal GHG emissions by forecast year

City of San Clemente Greenhouse Gas Forecasting Summary

Table 11. 2009, 2020, and 2030 Emissions

	Emissions Sector	Subsector	Forecast Proxy	GHG Emissions (Metric Tons CO_2e/yr)					
				2009	Contribution (%)	2020	Contribution (%)	2030	Contribution (%)
Community GHG Emissions	Energy - Electricity	Residential	Population Change	57,765	9%	58,083	9%	58,401	9%
		Commercial	Commercial Land Use	46,176	8%	47,416	8%	48,655	8%
		Industrial	Industrial Land Use	2,930	0%	2,854	0%	2,777	0%
		Subtotal		*106,871*	17%	*105,499*	*17%*	*107,056*	*17%*
	Energy - Natural Gas	Residential	Population Change	57,829	9%	58,147	9%	58,466	9%
		Commercial/Industrial	Commercial/Industrial Land U	9,420	2%	9,587	2%	9,753	2%
		Subtotal		*67,249*	*11%*	*67,734*	*11%*	*68,219*	*11%*
	Transportation	Community Travel	F&P Community VMT	417,740	68%	420,040	68%	422,340	68%
	Waste	Landfill	Population Change	6,115	1%	6,149	1%	6,182	1%
	Wastewater	Wastewater	Job Change	5,699	1%	5,811	1%	5,923	1%
	Water	Consumption	Job Change	16,350	3%	16,671	3%	16,992	3%
			Total Community GHG Emissions	**614,325**	**100%**	**616,093**	**100%**	**620,790**	**100%**

	Emissions Sector	Subsector	Forecast Proxy	GHG Emissions (Metric Tons CO2e/yr)					
				2009	Contribution (%)	2020	Contribution (%)	2030	Contribution (%)
Municipal GHG Emissions	Energy - Electricity	Buildings and Facilities	Municipal Area Change	1,006	17%	1,073	18%	1,073	18%
		Street Lights & Traffic Signals	Population Change	687	12%	691	11%	695	11%
		Water Department	Population Change	2,471	42%	2,485	41%	2,498	41%
		Subtotal		*4,164*	*71%*	*4,248*	*70%*	*4,266*	*70%*
	Energy - Natural Gas	Buildings and Facilities	Municipal Area Change	300	5%	320	5%	320	5%
	Transportation	Government Vehicles	F&P Gov Vehicles	619	11%	641	11%	641	11%
		Employee Commute	F&P Employee Commute	448	8%	464		464	8%
		Subtotal		*1,067*	*18%*	*1,105*	*18%*	*1,105*	*18%*
	Waste	Landfill	Municipal Employee Count	184	3%	192	3%	192	3%
	Water	Consumption	Municipal Employee Count	180	3%	188	3%	188	3%
			Total Municipal GHG Emissions	**5,895**	**100%**	**6,054**	**100%**	**6,071**	**100%**

FEHR PEERS

MEMORANDUM

Date: November 11, 2011

To: Chandra Krout, Krout & Associates

From: Chris Gray and Rafael Cobian, Fehr & Peers

Subject: ***Quantifying Effectiveness of San Clemente CAP Transportation Related GHG and VMT Reduction Measures***

Ref. IE11-0061

The purpose of this memorandum is to document, identify, and quantify the proposed Greenhouse Gas Reduction (GHG) Measures that might result from the implementation of alternative strategies related to transportation. For each strategy, we have provided a description of how the strategy, the potential reduction, and also the source for the reduction. In many cases, these reductions are discounted in that they would have a limited application such as applying only to work trips or new development areas of the City. For each of the strategies, we have provided the following information:

- A description of the category of reduction strategies including a list of potential strategies that would be included in each category
- The anticipated level of implementation or utilization
- A potential range of VMT or GHG reductions
- Sources to estimate the reductions

CITY OF SAN CLEMENTE WORKER CHARACTERISTICS

Worker trip data, based on the 2009 Census Longitudinal-Employer Household Dynamics Origin Destination Employment Statistic (LODES), was collected and analyzed to quantify and understand the work trips related to San Clemente. The LODES data showed that there are a total of 16,194 jobs in the City of San Clemente and have the following patterns:

- Worker Flows
    - 12,761 employees live outside the City but work in the City
    - 3,433 employees live and work in the City
    - 15,913 employees live in the City but work outside the City
- Distance to Work
    - 38% drive under 10 miles

- 19% drive between 10-24 miles
- 27% drive between 25 and 50 miles
- 16% drive over 50 miles

This data ultimately aids in the development of strategies and also helps develop the potential strategies and reductions.

STRATEGY #10 – PROVIDE ELECTRIC VEHICLE PARKING

Description

This project will implement accessible electric vehicle parking. The project will provide conductive/inductive electric vehicle charging stations and signage prohibiting parking for non-electric vehicles.

Some potential strategies that would be included in this category would include:

- Require Electric Vehicle Parking- This measure would implement policies as part of the Municipal Code requiring a certain amount of electric vehicle only parking spaces with charging stations be provided.

- Provide Preferential Parking for Electric Vehicles- This measure would include providing preferential parking in convenient locations such as near public transportation, building front doors, and downtown centers or providing free or reduced parking fees for electric vehicles.

Predicted Level of Implementation

Our review of existing electric vehicle charging station parking facilities in San Clemente indicates that there are currently no facilities present. As such, there is opportunity to expand these facilities. We have therefore assumed for the purposes of this analysis that San Clemente would expand its existing facilities to provide some electric vehicle only parking along with charging stations.

Potential VMT Reductions

This strategy is not quantified as a standalone strategy.

STRATEGY #11 – EXPAND PEDESTRIAN NETWORK

Description

Providing a pedestrian access network to access all areas of San Clemente encourages people to walk instead of drive. The mode shift results in people driving less and thus reducing VMT.

Some potential strategies that would be included in this category would include the widening of any existing sidewalks, the completion of any gaps in the sidewalk network, or the extension of any existing sidewalks to provide access to desired areas of the City. This would also require eliminating physical barriers such as walls, landscaping, and slopes that impede pedestrian

circulation. It is anticipated that much of this pedestrian network expansion would occur in conjunction with development and redevelopment throughout the City.

Predicted Level of Implementation

The implementation mechanism would be the Santa Clemente Bicycle and Pedestrian Master Plan, scheduled to be adopted Winter 2011/2012, which will serve as a roadmap for developing pedestrian infrastructure and programs in the City. It will encourage development of practical, safe, and enjoyable environments all while emphasizing and promoting walking as a viable transportation option.

Potential VMT Reductions

Empirical research indicates that a pedestrian network improvements yield a 1-2 percent reduction in VMT, based on the scale of the proposed improvements. As these improvements are potential limited in scale to various areas of the City, we would recommend applying the more limited VMT reduction at 1 percent.

Sources

Center for Clean Air Policy (CCAP) Transportation Emission Guidebook.
http://www.ccap.org/safe/guidebook/guide_complete.html

1000 Friends of Oregon (1997) "Making the Connections: A Summary of the LUTRAQ Project" (p. 16).
http://www.onethousandfriendsoforegon.org/resources/lut_vol7.html

Nelson\Nygaard, 2010. City of Santa Monica Land Use and Circulation Element EIR Report, Appendix – Santa Monica Luce Trip Reduction Impacts Analysis (p.401).
http://www.shapethefuture2025.net/

Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions. (p. 11)
http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf

STRATEGY #12 – REQUIRE BICYCLE PARKING

Description

One way to facilitate bicycle travel is to require bicycle parking for both public and private uses. This strategy would identify additional opportunities to place public use bicycle parking or to modify existing parking requirements for bicycle with the aim of increasing the supply of parking. This strategy would be limited in that it would apply to selected new developments within the City which are larger than an identified threshold in terms of building size, number of employees, or other applicable criteria.

Some potential strategies that would be included in this category would include:

- Residential Bicycle Parking- This measure would include requiring non-residential projects to provide short-term and long-term bicycle parking facilities to meet peak

season maximum demand along with requiring residential multi-family projects to provide long-term parking facilities for all residents.

- Transit Bicycle Parking- This measure would provide short-term and long-term bicycle parking near rail stations, transit stops, freeway access points, and park-and-ride lots. Bicycle parking provides a "first-mile" solution to commuters who may have limited access to major transportation hubs.

Predicted Level of Implementation

The implementation mechanism would be the Santa Clemente Bicycle and Pedestrian Master Plan, scheduled to be adopter Winter 2011/2012. The City should also work with local transit providers to implement parking at transit facilities.

Potential VMT Reductions

The effects of bicycle parking on worker trips is most applicable to those workers who live and work in the City of San Clemente, which comprises about 21% of the total worker trips coming into San Clemente. Additionally, these facilities may also be used by shorter work trips, which make up about 38% of all work trips

Empirical studies indicate that the maximum reduction in VMT achieved with this strategy is approximately 0.5%. We would therefore consider that this reduction would be likely maximum that the City could achieve, particularly given the limited scale of application that might occur by limiting the requirements to a subset of new development.

Sources

Center For Clean Air Policy (CCAP) Transportation Emission Guidebook. http://www.ccap.org/safe/guidebook/guide_complete.html;

Cambridge Systematics. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.* Technical Appendices. Prepared for the Urban Land Institute.

http://www.movingcooler.info/Library/

STRATEGY #13 – DEVELOP OFF-STREET BICYCLE FACILITIES

Description

Another means to encourage bicycle travel is to develop and implement off-street bicycle trails which can be used for both recreational travel and commuting purposes.

Some potential strategies that would be included in this category would include requiring buildings of certain size or adjacent to bikeways to include off-street bicycle paths or lanes in their plans and to construct them as part of their project approval.

Predicted Level of Implementation

Similar to Strategy #11, the implementation mechanism would be the Santa Clemente Bicycle and Pedestrian Master Plan, scheduled to be adopted Winter 2011/2012, which will serve as a roadmap for developing bicycle infrastructure and programs in the City. It will encourage development of practical, safe, and enjoyable environments all while emphasizing and promoting bicycling as a viable transportation option.

Potential VMT Reductions

Research has shown that adding bicycle facilities can increase the percentage of commuters who travel by bicycle. This increase is generally small (1 percent or less) and typically occurs with the construction or designation of new bicycle facilities. As such, we would assume that the benefits of this strategy would be 1 percent of VMT as this represents the typical experience observed.

Sources

Dill, Jennifer and Theresa Carr (2003). "Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Tem, Commuters Will Use Them – Another Look." *TRB 2003 Annual Meeting CD-ROM*.

Cambridge Systematics. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.* Technical Appendices. Prepared for the Urban Land Institute. http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf

Nelson, Arthur and David Allen (1997). "If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities."*Transportation Research Record 1578.*

STRATEGY #14 – REQUIRE END OF TRIP FACILITIES

Description

End of trip facilities encourage the use of bicycling as a viable form of commute travel by providing the added convenience and security. This strategy would apply to both City and non-City employees. There are existing requirements in the TDM ordinance to provide these facilities. This strategy could involve the potential expansion of these facilities through a modification of the TDM ordinance.

Some potential strategies that would be included in this category would include requiring new and existing non-residential projects of a certain minimum size along with public places to provide "end-of-trip" facilities. End trip facilities include bicycle lockers, shower facilities, and changing rooms.

Predicted Level of Implementation

The City should work with local employers to implement this measure.

Potential VMT Reductions

These end of trip facilities are most applicable to those workers who live and work in the City of San Clemente, which comprises about 21% of the total worker trips coming into San Clemente. Additionally, these facilities may also be used by shorter work trips, which make up about 38% of all work trips.

Research has indicated that these facilities have a benefit of reducing commute trips by 2 percent to 5 percent. As work trips are only 25 percent of total VMT, we have discounted the potential effectiveness of the strategy by 75 percent, which will therefore result in a maximum effectiveness of only 1 percent for the implement of this strategy.

Sources

Pucher J., Dill, J., and Handy, S. *Infrastructure, Programs and Policies to Increase Bicycling: An International Review.* February 2010. (Table 2, pg. S111) http://policy.rutgers.edu/faculty/pucher/Pucher_Dill_Handy10.pdf

Victoria Transportation Policy Institute (VTPI). *TDM Encyclopedia,* http://www.vtpi.org/tdm/tdm9.htm; accessed 3/4/2010; last update 1/25/2010). VTPI citing: Reid Ewing (1993), "TDM, Growth Management, and the Other Four Out of Five Trips," *Transportation Quarterly*, Vol. 47, No. 3, Summer 1993, pp. 343-366.

Center for Clean Air Policy (CCAP), *CCAP Transportation Emission Guidebook*. http://www.ccap.org/safe/guidebook/guide_complete.html; TIAX Results of 2005 Literature Search Conducted by TIAX on behalf of SMAQMD.

STRATEGY #15 – INCORPORATE BIKE LANE STREET DESIGN THROUGH SAN CLEMENTE BIKE PLAN

Description

The City's proposed Bike Plan will incorporate bicycle lanes, routes, and shared-use paths into street systems, new subdivisions, and large developments. These on-street bike accommodations will be created to provide a continuous network of routes, facilitated with markings and signage. These improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. In addition, improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area" of these transit stop or station and increasing ridership. Bicycle access can also reduce parking pressure on heavily used and/or heavily subsidized feeder bus lines and auto-oriented park-and-ride facilities.

Predicted Level of Implementation

Similar to Strategy #11, the implementation mechanism would be the Santa Clemente Bicycle and Pedestrian Master Plan, scheduled to be adopted Winter 2011/2012, which will serve as a roadmap for developing bicycle infrastructure and programs in the City. It will encourage development of practical, safe, and enjoyable environments all while emphasizing and promoting bicycling as a viable transportation option.

Potential VMT Reductions

Research has shown that adding bicycle facilities can increase the percentage of commuters who travel by bicycle. This increase is generally small (1 percent or less) and typically occurs with the construction or designation of new bicycle facilities. As such, we would assume that the benefits of this strategy would be 1 percent of VMT as this represents the typical experience observed.

Sources

Dill, Jennifer and Theresa Carr (2003). "Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Tem, Commuters Will Use Them – Another Look." *TRB 2003 Annual Meeting CD-ROM*.

Cambridge Systematics. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.* Technical Appendices. Prepared for the Urban Land Institute. http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf

Nelson, Arthur and David Allen (1997). "If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities."*Transportation Research Record 1578.*

We hope you find this information helpful. If you have any questions or require additional clarification, please contact Chris Gray at 951-274-4801 or by email at c.gray@fehrandpeers.com.

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December 29, 2011

Ms. Chandra Krout
Principal, Krout and Associates
2321 Lincoln Avenue
San Clemente, CA, 92104

Subject: City of San Clemente – Greenhouse Gas Targets and Reduction Measures

Dear Ms. Krout:

This memorandum provides greenhouse gas targets, local and California statewide reduction measures to support the City of San Clemente's Climate Action Plan (CAP). Where possible, the data should be representative of the recommended forecast years 2020 and 2030 to comply with federal, state, and local regulations (i.e., AB 32 and EO S-3-05) and coincide with the build out of the upcoming General Plan Update.

This effort is a collaborative between the City of San Clemente, Fehrs and Peers, Krout and Associates, and Healthy Buildings. Please feel free to contact me with any questions.

Thank you,

Lena Ohta

Lena Ohta, CRM, LEED AP
Sustainability Advisor, GHG Analyst
T: 949.450.1111
M: 949.371.3365
lohta@healthybuildings.com

Executive Summary

The City of San Clemente is a sustainability leader by understanding their greenhouse gas (GHG) emissions. Therefore, Healthy Buildings conducted an analysis of various local (City) and California State (State) greenhouse gas reduction measures. This document outlines the methodologies, data assumptions, and sources used to estimate the State GHG reduction measures for the City of San Clemente. Calculations are based on a series of city-based GHG emission inventory and forecast analysis.

The City of San Clemente is pursuing a 20% reduction for 2020 and 40% reduction for 2030, as specified in an email by Chandra Krout on October 28, 2011. These forecast years for 2020 and 2030 to reflect federal, state, and local regulations (i.e., AB 32 and EO S-3-05) and coincide with the build out of the upcoming General Plan Update.

Healthy Buildings, under the guidance of K&A, determined State measures to quantify in relation to the San Clemente's forecasting years. **Combined Citywide and Statewide reduction measures are expected to decrease emission by 17% in 2020 and 43% for 2030.** Reduction measures for 2020 are included in the values for 2030.

Sector	Reduction Measure	2020 Emissions		2030 Emissions	
Local Reduction Measures		**MT CO2e**	**% of Reduction**	**MT CO2e**	**% of Reduction**
Energy	Residential Efficiency Retrofits	3,487	3%	8,746	3%
	Commercial Efficiency Retrofits	1,796	2%	4,549	2%
	Residential New Construction Efficiency	2,044	2%	6,216	2%
	Commercial New Construction Efficiency	1,611	1%	4,900	2%
	Residential Solar Water Heaters	5,505	5%	19,342	7%
Transportation	Combined Transportation Measures	4,200	5%	4,223	2%
Waste	Expand Waste Material Diversion	1,538	1%	2,156	1%
	Total Citywide Reduction Measures	**20,181**	**18%**	**70,313**	**26%**
State Reduction Measures					
Energy	CA Renewable Portfolio Standard	40,894	37%	40,894	15%
	CA Electricity Energy Efficiency Standards	5,487	5%	16,071	6%
	CA Natural Gas Efficiency Standards	1,361	1%	6,064	2%
Transportation	CAFE (Pavley) & LCFS	37,903	35%	41,758	16%
Water	Water Conservation Program	3,372	3%	3,372	1%
	Total Statewide Reductions Measures	**89,018**	**82%**	**197,177**	**74%**
	Total GHG Reductions	**109,199**	**100%**	**267,490**	**100%**

Table 1. Summary of Emission Local and State Reduction Measures. All values are shown in terms of MT CO_2e.

Categories	2020 Emissions		2030 Emissions	
	MT CO2e	% of Total Reduction	MT CO2e	% of Total Reduction
Total Forecasted Emissions (BAU)	627,958		632,784	
Total After Measures	518,759	17%	365,295	43%
Target	533,764	15%	379,671	40%

Table 2. Target Feasibility Summary. Reduction measures compared to forecasted and targeted emission reductions.

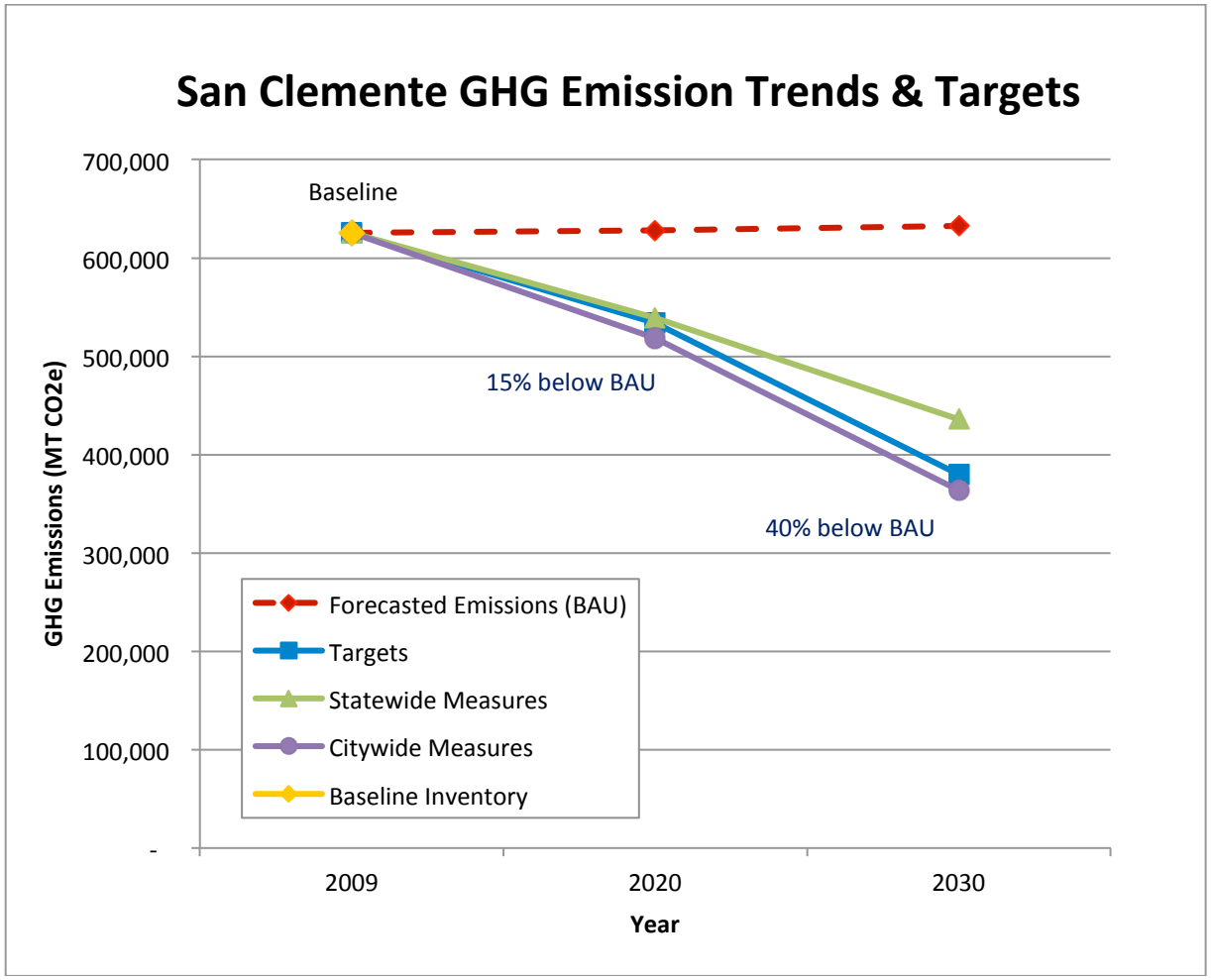

Figure 1. City of San Clemente GHG Emission Trends and Targets. This Graph includes the baseline year 2009, business-as-usual projects for 2020 and 2030, emission targets, emission reduction including State and City measures.

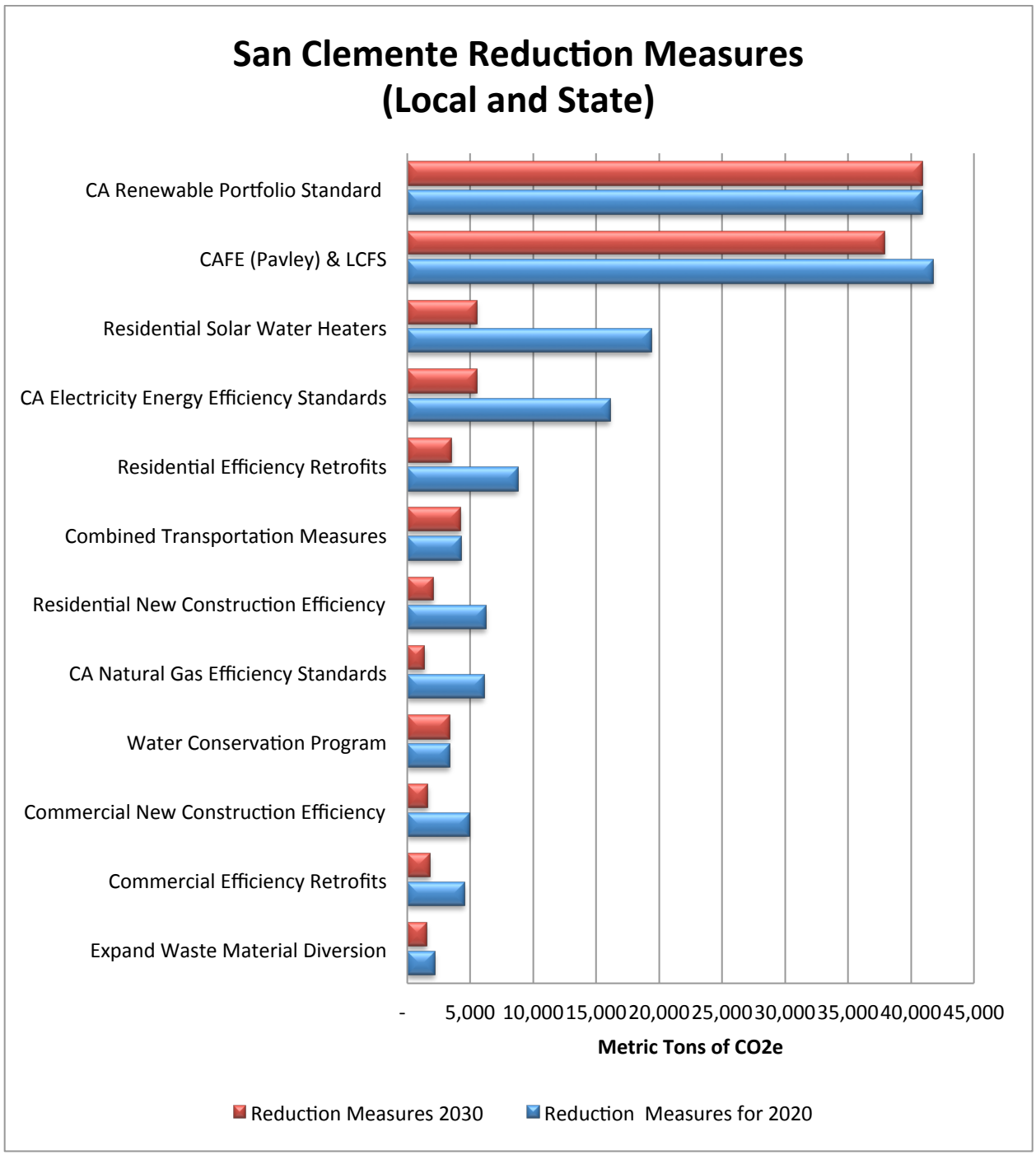
San Clemente Reduction Measures
(Local and State)
CA Renewable Portfolio Standard
CAFE (Pavley) & LCFS
Residential Solar Water Heaters
CA Electricity Energy Efficiency Standards
Residential Efficiency Retrofits
Combined Transportation Measures
Residential New Construction Efficiency
CA Natural Gas Efficiency Standards
Water Conservation Program
Commercial New Construction Efficiency
Commercial Efficiency Retrofits
Expand Waste Material Diversion
- 5,000 10,000 15,000 20,000 25,000 30,000 35,000 40,000 45,000
Metric Tons of CO2e
Reduction Measures 2030
Reduction Measures for 2020

Figure 2. Affect of Individual Local and State Measures by Milestone Year.

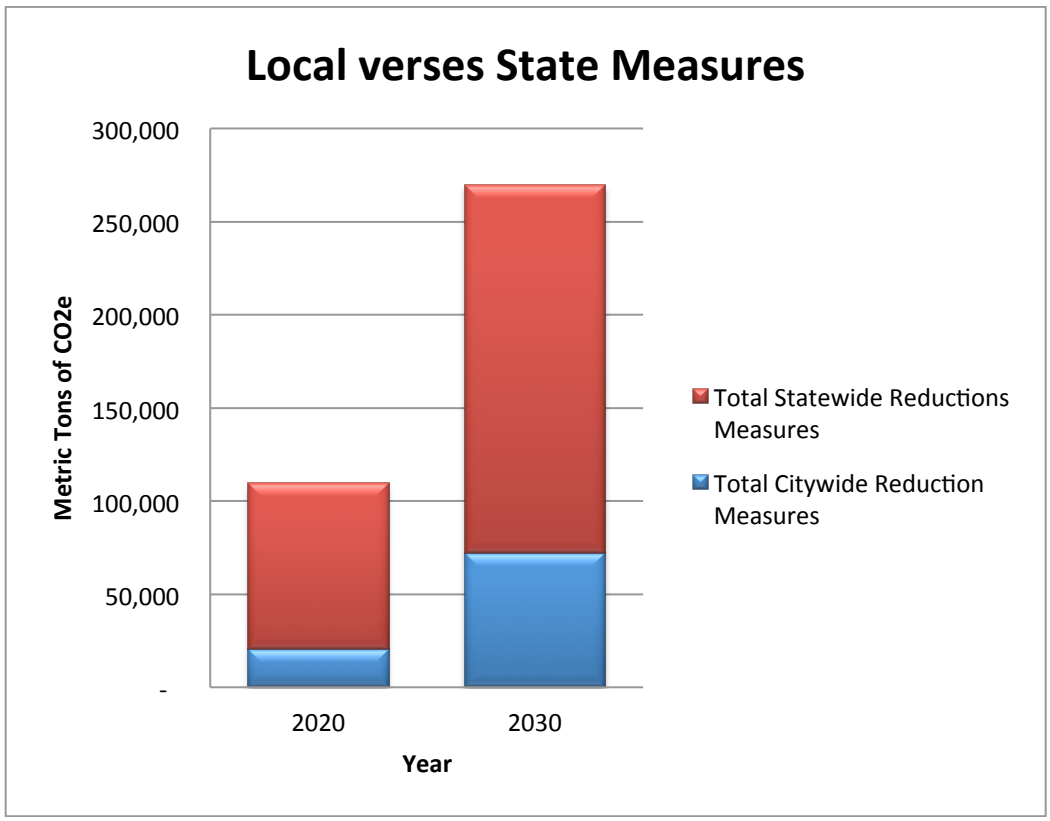

Figure 3. Aggregated Local and State Measures by Milestone Year.

Emission Sector	2020 Emissions		2030 Emissions	
	MT CO2e	% of Total Reduction	MT CO2e	% of Total Reduction
Energy	62,186	57%	106,781	68%
Transportation	42,103	39%	45,982	29%
Water	3,372	3%	3,372	2%
Waste	1,538	1%	2,156	1%
Total GHG Reductions	**107,701**	**100%**	**156,215**	**100%**

Table 3. Reduction Measures by Emission Sector.

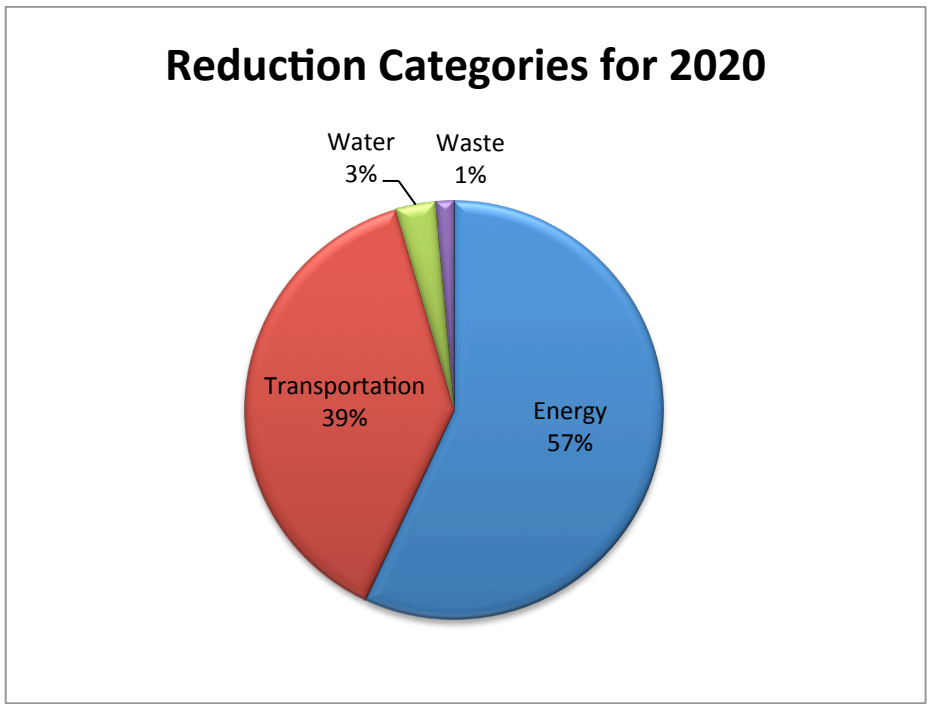

Figure 4. Contribution of Reduction Measure Categories for 2020.

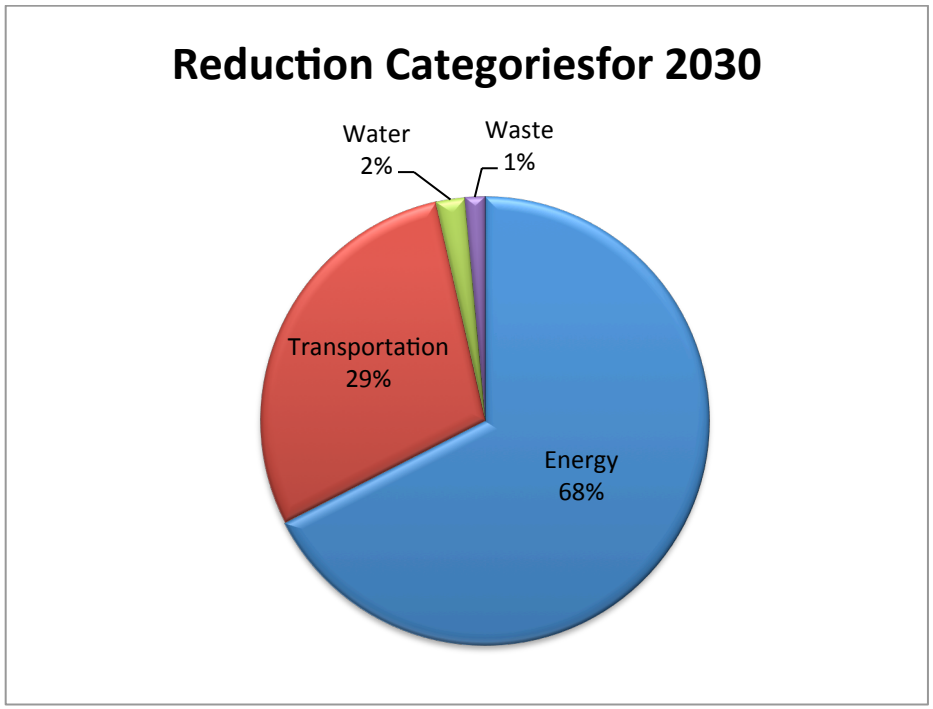

Figure 4. Contribution of Reduction Measure Categories for 2030.

Local Greenhouse Gas Reduction Measures

Residential Efficiency Retrofits

Description
The residential sector in the City of San Clemente accounts for about 9% of electricity use and 9% of natural gas use. Much of this consumption is associated with existing buildings. This measure estimates the energy and greenhouse gas reductions associated with implementing energy efficiency retrofits in single family and multi-family homes.

Assumptions and Inputs

- Participation Rate and Average Energy Savings – The calculations assume 10% of existing residential homes are retrofit to reduce energy use by 30% per unit by 2020, and 15% of existing residential homes are retrofit for an energy savings of 30% per unit by 2030.
- Energy Reductions Calculation – Energy reductions are calculated as a percentage of average residential energy consumption. The average residential electricity and natural gas consumption value is converted to million British thermal units (MMBTU) and combined to create a normalized energy consumption value. Reductions are calculated by taking a percentage of the normalized MMBTU value and then divided between electric and gas based on an average allocation between the two of 40% electric and 60% natural gas.

Sources

- California Public Utilities Commission Database for Energy Efficient Resources (DEER), available at http://www.deeresources.com/.
- Berkeley Residential Energy Conservation Ordinance, available at http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=16030.
- Meeting AB 32 - Cost-Effective Green House Gas Reductions in the Residential Sector. CONSOL, August 2008, available at http://www.consol.ws/studies.php.
- Critical Cooling, SPUR, February 2009, available at http://www.spur.org/publications/library/report/critical_cooling).

Commercial Efficiency Retrofits

Description
The commercial sector accounts for 7% of electricity use and 2% of natural gas use in the City of San Clemente. Much of this is associated with existing buildings. This measure estimates the energy and greenhouse gas reductions associated with implementing energy efficiency retrofits in commercial buildings.

Assumptions and Inputs

- Participation Rate and Average Energy Savings – The calculations assume 10% of existing non-residential square footage is retrofit to reduce energy use by 30% per square foot by 2020, and 15% of existing non-residential homes are retrofit for an energy savings of 30% per unit by 2030.

- Percentage of Commercial Area that Can be Retrofit – The City calculations assumes that all commercial area in San Clemente is eligible to be retrofit regardless of age. Therefore, the target of reaching 15% means that 15% of all commercial square footage in the City of San Clemente is retrofit.
- Energy Reductions Calculation – Energy reductions are calculated as a percentage of average commercial energy consumption per square foot. The average commercial electricity and natural gas consumption value is converted to million British thermal units (MMBTU) and combined to create a normalized energy consumption value. Reductions are calculated by taking a percentage of the normalized MMBTU value and then divided between electric and gas based on an average allocation between the two of 70% electric and 30% natural gas.

Sources

- ICLEI – Local Governments for Sustainability, Local Government Operations Protocol, Appendix G Emission Factors, available at http://www.theclimateregistry.org/downloads/2010/05/2010-05-06-LGO-1.1.pdf.
- California Public Utilities Commission Database for Energy Efficient Resources (DEER), available at http://www.deeresources.com/.

Residential New Construction Efficiency

Description

California has strong building energy standards; many local governments require or encourage new construction projects to exceed these standards. This measure estimates the incremental greenhouse gas reductions from exceeding statewide standards. For the residential sector, the total greenhouse gas reduction value includes both single family and multifamily dwellings. Note that this measure only estimates the incremental greenhouse gas reductions associated with requirements that are better than statewide building energy codes; energy reductions from statewide standards are described in the Statewide Measures section.

Assumptions and Inputs

- Participation Rate – The City calculations assume that 15% of residential projects participate through 2016 and then 100% of projects participate through 2020.
- Average Energy Savings – The calculations assume that all new residential construction reduces energy savings to a level that is equivalent to 15% better than Title 24 requirements. Calculations assume emission reductions 1% better than Title 24 are 0.15% for electricity and 0.89% for natural gas. These values reflect multifamily residential rates.
- Dwelling Unit Size – Calculations assume the median area for a dwelling unit is 1,747 square feet.
- Climate Zone – Emission rates reflect multifamily residential rates for Climate Zone 2. San Clemente is located in Climate Zone 6; however, values for Climate Zone 3 were used per CAPCOA methodology.

- Energy Conditions – Calculations assume emission factors for SDG&E electricity generation and the US average for commercial and residential natural gas generation. Electricity intensity is 8.32 kWh per square foot per year, which is adjusted to reflect Title 24 2008 standards. Natural gas intensity is 18.16 KTBU per square foot per year, which is adjusted to reflect Title 24 2008 standards.
- Rate of Residential New Construction – For residential projects, it is assumed new developments are high density multifamily residential. Multifamily dwellings units are expected to increase at a rate of 0.64% by 2020 and 0.63% by 2030. The Planning Center's adopted and preferred land use breakdowns were linearly interpolated to estimate the residential growth and amount of dwelling units. Dwelling units are expected to increase by 111 units between 2010 and 2016, 74 units between 2017 and 2020, and 185 units between 2021 and 2030.
- Energy Reductions Calculation – Energy reductions are calculated as a percentage of average energy consumption per square foot for commercial and per unit for residential. The average electricity and natural gas consumption value is converted to million British thermal units (MMBTU) and combined to create a normalized energy consumption value. Reductions are calculated by taking a percentage of the normalized MMBTU value and then divided between electric and gas based on an average allocation between the two: 40% electric and 60% natural gas for residential.

Sources

- California Air Pollution Control Officers Association (CAPCOA), Quantifying Greenhouse Gas Mitigation Measures, August 2010, Table BE-1.2, available at http://www.capcoa.org/wp-content/uploads/downloads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- California Energy Commission Residential Appliance Saturation Survey, available at http://www.energy.ca.gov/appliances/rass/.
- San Clemente Association of Governments population and housing projections, SANDAG Data Warehouse, available at http://datawarehouse.sandag.org/.
- US Census Bureau, Statistical Abstract of the United States, Section 20 Construction and Housing, Table 953 West Region, available at http://www.census.gov/prod/2007pubs/08abstract/construct.pdf.

Commercial New Construction Efficiency

Description

California has strong building energy standards; many local governments require or encourage new construction projects to exceed these standards. This measure estimates the incremental greenhouse gas reductions from exceeding statewide standards. Note that this measure only estimates the incremental greenhouse gas reductions associated with requirements that are better than statewide building energy codes; energy reductions from statewide standards are described in the Statewide Measures section.

Assumptions and Inputs

- Participation Rate – The City calculations assume that 15% of residential and commercial projects participate through 2016 and then 100% of projects participate through 2020.
- Average Energy Savings – The City assumes that all new residential and commercial construction reduces energy savings to a level that is equivalent to 15% better than Title 24 requirements. Calculations assume emission reductions 1% better than Title 24 are 0.31% for electricity and 0.73% for natural gas. These values reflect multifamily residential rates.
- Climate Zone – Emission rates reflect all commercial rates for Climate Zone 6 per CAPCOA methodology.
- Energy Conditions – Calculations assume emission factors for SDG&E electricity generation and the US average for commercial and residential natural gas generation. Electricity intensity is 8.32 kWh per square foot per year, which is adjusted to reflect Title 24 2008 standards. Natural gas intensity is 18.16 KTBU per square foot per year, which is adjusted to reflect Title 24 2008 standards.
- Rate of Commercial New Construction – For commercial projects, it is assumed new developments are high density multifamily residential. Commercial area expected to increase at a rate of 1.77% by 2020 and 3.54 % by 2030. Values provided by the Planning Center.
- Energy Reductions Calculation – Energy reductions are calculated as a percentage of average energy consumption per square foot for commercial and per unit for residential. The average electricity and natural gas consumption value is converted to million British thermal units (MMBTU) and combined to create a normalized energy consumption value. Reductions are calculated by taking a percentage of the normalized MMBTU value and then divided between electric and gas based on an average allocation between the two: 70% electric and 30% natural gas for commercial**.**

Sources

- California Air Pollution Control Officers Association (CAPCOA), Quantifying Greenhouse Gas Mitigation Measures, August 2010, Table BE-1.2, available at http://www.capcoa.org/wp-content/uploads/downloads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- California Energy Commission Commercial End Use Study California Energy Commission, available at http://www.energy.ca.gov/ceus/.

Residential Solar Water Heating Retrofit

Description

Promote the California Solar Initiative's solar water heating incentive program to subsidize the purchase of solar water heaters and replace/recycle old water heaters in homes. On January 21, 2010, the CPUC approved a Decision creating the CSI-Thermal Program, which allocates significant funding to promote solar water heating (SWH) through a program of direct financial incentives to retail customers, training for installers and building inspectors, and a statewide marketing campaign. Assumptions used to estimate the emission reductions from solar water heaters are provided below.

Assumptions and Inputs

- Participation Rate – The City assumes that 10% of existing single-family homes install solar water heaters by 2020 and 25% by 2030.
- Ratio of Electric and Natural Gas Water Heaters – The City estimate assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. We further assume that 40% offset electric water heaters and 60% of the systems offset natural gas water heaters.
- Energy Savings – Calculations assume annual energy reduction is 2,700 kWh for an electric water heater and 117 therms for natural gas. Conventional water heaters are assumed to have an annual energy consumption of 5,082 kWh/yr/unit and 253 therms per year per unit.
- Single Family Housing Only – The estimates here only calculates the effect of solar water heaters on single-family homes. Single family residences account for 93% of dwelling units.

Sources

- California Solar Initiative (CS) Solar Water Heating Pilot Program, Itron Final Evaluation Report, March 2011, available at http://energycenter.org/index.php/incentive-programs/solar-water-heating/swhppdocuments/doc_download/727-swh-pilot-program-itron-final-evaluation-report.
- California Public Utilities Commission (CPUC) Decision 10-01-022, January 2010, available at http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/112748.htm.
- US Department of Energy, Federal Energy Management Program, Energy and Cost Calculator for Electric and Gas Water Heaters, available at http://www1.eere.energy.gov/femp/technologies/eep_waterheaters_calc.html..

Combined Transportation Measures

Description

See Fehr & Peers Memorandum to document, identify, and quantify the proposed GHG measures that might result from the implementation of alternative strategies related to transportation. For each strategy Fehr & Peers, provided a description of the strategy, potential reduction, and source of reduction.

Assumptions and Inputs

- Transportation Calculation – The impact of transportation related measures were combined and estimated to equate a 1% reduction from the forecasted transportation emissions.

Sources

- Fehr & Peers Memorandum, November 2011, Quantifying Effectiveness of San Clemente CAP Transportation Related GHG and VMT reduction measures (Ref. IE11-0061).

Increase Waste Diversion Program

Description

Integrated Waste Management Act (IWMA), also known as AB 939, mandates a comprehensive statewide system to divert 50% of waste generation. This measures aim to expand on existing statewide programs to achieve 75% diversion rate by 2020 and 90% diversion rate by 2030. The EPA WARM Waste model was used to estimate greenhouse emissions from waste operations for the baseline year and BAU forecasts for 2020 and 2030. Raw waste data was provided by the City and initial greenhouse emissions were calculated by AECOM. BAU calculations and reduction measures were calculated by Healthy Buildings.

Assumptions and Inputs

- Baseline Diversion Rate – The City of San Clemente has estimates baseline citywide waste is 50,571 tons per year with 71% of total waste diverted from landfill and/or recycled.
- Waste Generation Rates – Calculations assume that projected reductions commensurate with business-as-usual forecasting. Business-as-usual emissions increase 0.55% for 2020 and 0.55% for 2030.
- Target Diversion Rates – The City is targeting a 75% diversion rate by 2020 and 90% diversion rate by 2030.
- Waste Reduction Calculations – Waste streams were interpolated from an aggregated solid waste total based on statewide waste characterization percentages. California Statewide waste characterization is extrapolated for San Clemente. EPA WARM emission factors were use for each waste characterization subsection. Since the EPA WARM model does not have a standard emission rate for mixed MSW, 0 was used to create a neutral metric. The targeted emission reduction was applied to the total greenhouse gas emissions. The mixed MSW emission factor was used to confer the targeted emission savings to generic tons annually targeted for diversion.

Sources

- EPA Waste Reduction Model (WARM), August 2010, available at http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html#click.
- California Integrated Waste Management Board and San Clemente Times, Recycling Efforts Leave Less for Landfills, Stacie N. Galang, August 2011, available at http://sanclementetimes.com/view/full_story/15204994/article-Recycling-Efforts-Leave-Less-for-Landfills.
- CalRecycle Electronic Annual Report, San Clemente Waste Summary for 2009, July 2010, available at http://secure.calrecycle.ca.gov/LoGIC/External/AnnualReport/Summary.aspx.
- California 2008 Statewide Waste Characterization Study, August 2009, available at http://www.calrecycle.ca.gov/Publications/General/2009023.pdf.

State Greenhouse Gas Reduction Measures

California Renewable Portfolio Standard

Description
Legislation signed into law in 2011 requires California's electric utilities to provide 33% of electricity supplies from renewable sources. This requirement is known as the Renewable Portfolio Standard (RPS). Increasing the level of renewable energy supply lowers the greenhouse gas intensity of electricity (lbs/MWh). The following assumptions are used to calculate the emissions reductions expected from the Renewable Portfolio Standard.

Assumptions and Inputs

- RPS Targets – It is assumed that SDG&E will reach the 33% target by 2020 and maintains that level through 2030.
- Electricity Sales as a Baseline for RPS Calculation – Estimates use electricity sales as the baseline to calculate the emissions impact of renewable supply in the region. The level of sales is adjusted to account for energy efficiency measures included in the City of San Clemente.
- Baseline Renewable Supply – Estimates incorporated the baseline year's renewable power mix.
- Renewable Energy has No Emissions – For simplicity, calculations here assume that all renewable energy supply emits no greenhouse gases.

Sources

- Renewable Portfolio Standard Bill (SBX 1 2), available at http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sbx1_2_bill_20110412_chaptered.pdf.

Statewide Energy Efficiency Standards

Description
California has established aggressive appliance and new building standards. The City of San Clemente includes estimates for how much statewide efficiency standards will reduce emissions. Note that under the auspices of the California Public Utilities Commission (CPUC) the states' investor-owned utilities, including San Clemente Gas & Electric (SDG&E), administer energy efficiency programs. Electricity, natural gas and greenhouse gas reductions associated with these programs are not included in the energy reductions of this measure and are included in the local buildings measures described below. The following assumptions are used to calculate the emissions reductions expected from statewide efficiency standards.

Assumptions and Inputs

- Total Reduction in Electricity and Natural Gas Use – Calculations assume that statewide standards reduce total electricity use by 5% by 2020 and 10% by 2030 and natural gas by 2% and 7%, respectively.

Sources:

- Electricity and Natural Gas Committee. *Incremental Impacts of Energy Policy Initiatives Relative to the* 2009 Integrated Energy Policy Report *Adopted Demand Forecast*. CEC-200-001-CTF, available at http://www.energy.ca.gov/2010publications/CEC-200-2010-001/index.html.
- Itron, Incremental Impacts of Energy Efficiency Policy Initiatives Relative to the 2009 Integrated Energy Policy Report Adopted Demand Forecast, Attachment A – Technical Report (January 2010), available at http://www.energy.ca.gov/2010publications/CEC-200-2010-001/CEC-200-2010-001-ATA.PDF.

CAFE standards (Pavley): Passenger Vehicle and Light Duty Truck Fuel Economy

Description

California and other states agreed to conform to the latest federal mpg standards, known as the Corporate Average Fuel Economy Standards, CAFE, announced in May 2009, in place of the state AB 1493 (2002, Pavley I), which required manufacturers to conform to stringent tailpipe emissions standards for greenhouse gases. California has thus amended AB 1493 (Pavley I) to conform to the federal CAFE standard from 2012 to 2016, on condition that it receives a waiver to set its own vehicle standards after 2016 and enforce its standards for model years 2009 to 2011. CAFE mandates the sales-weighted average fuel economy (in mpg) of the passenger cars and light-duty trucks for a manufacturer's fleet. New passenger vehicles must meet sales weighted average of 39 mpg, light duty trucks a value of 30 mpg, resulting in an average 35.5 mpg for the fleet if it is met only by fuel economy improvements. This corresponds to a CO_2e target of 250 grams/mile in 2016 from those vehicles.

Assumptions and Inputs

- Date Achieved – The City of San Clemente assumes that Pavley I or CAFE 2016 standards for new passenger vehicles are achieved by 2020. Pavley and LCFS calculations were based on ARB's EMFAC 2011 model and Fehr and Peers Memorandum published March 3, 2011.
- Improvements after 2020 – It is assumed that there will be no further fuel economy or tailpipe emission standards in 2030.

Source

- Average Fuel Economy Standards, Passenger Cars and Light Trucks, MY 2011; Final Rule is available at http://www.nhtsa.gov/fuel-economy.

Low Carbon Fuel Standard (LCFS)

Description

The California LCFS (2010) requires that, starting January 1, 2011 and for each year thereafter, a regulated party must meet the average carbon intensity requirement of 10% reduction in carbon intensity per Mega joule for its transportation gasoline and diesel fuel in 2020. Electricity suppliers are considered regulated parties only if they elect to provide credit to fuel distributors. At this time, there are no monitoring reports of the status of use of electricity credits for the LCFS to indicate the magnitude of carbon intensity reduction that electric vehicles will play in 2020. Therefore, for the City of San Clemente purposes, miles driven by electric vehicles are not considered a part of this standard. The City of San Clemente also assumes no new low carbon fuel mandates in 2030. It is possible that the interaction of this standard with electric vehicles will have to be re-visited in a few years.

Assumptions and Inputs

- Pavley and LCFS calculations were based on ARB's EMFAC 2011 model and Fehr and Peers Memorandum published March 3, 2011.

Source

- Information about the LCFS program is available at http://www.arb.ca.gov/fuels/lcfs/lcfs.htm.

Water Conservation Program

Description

California Senate Bill X7-7 (2009) requires all water suppliers to reduce urban per capita water consumption by 2020 – either through the "standard target", a 20 percent reduction from the average water demand between 1994 and 2004, or the "alternative minimum", a five percent reduction from the average water demand between 2003 and 2007. The City should select this alternative if it has adopted or is preparing a plan that demonstrates a SB X7-7 compliance path. If selected, the CAP would not prescribe additional specific conservation measures but rather take credit for the policies and actions that the City will implement to achieve the SB X7-7 conservation target. SB X7-7 is a "state" reduction potential; therefore, no additional measures are suggested at the local level. Emissions reductions would be based on the programs total anticipated water savings in the target years.

Source

- Water Conservation Act (SB X7-7), available at http://www.water.ca.gov/wateruseefficiency/sb7/.